Installation Guide

BR-Series Adapters

Converged Network Adapter Models BR-1007, 1741, 1020
Fibre Channel Adapter Models BR-804, 815, 825, 1867, 1869
Fabric Adapter Model BR-1860

BR0054504-00 A

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Preface

Intended Audience

This guide introduces users to the BR-Series adapters and explains its installation and service. It is intended for users who are responsible for installing and servicing network equipment.

What Is in this Guide

This manual provides installation and reference information on QLogic host bus adapters, converged network adapters (CNAs), and Fabric Adapters for version 3.2.4. It is organized to help you find the information that you want as quickly and easily as possible.

The document contains the following components:

- Chapter 1, "Product Overview" provides a detailed product overview and description. Information on adapter hardware and software compatibility is also included.
- Chapter 2, "Hardware Installation" provides procedures to install adapter hardware and connect to the fabric or switch. Also included are procedures to verify hardware and software installation.
- Chapter 3, "Software Installation" provides procedures to install software, such as the QLogic Host Connectivity Manager (HCM) and driver packages. Also included are instructions to verify software and hardware installation. Use this chapter to install software on the host system where you have installed the adapter.
- Chapter 4, "Boot Code" describes host boot support available on the adapter and provides an introduction to boot over SAN. It also includes procedures to update adapter boot code, configure boot over SAN, and configure fabric-based boot over SAN. Use this chapter when configuring a host to boot its operating system from a boot device located somewhere on the SAN instead of the host's local disk or direct-attached storage.
- Chapter 5, "Specifications" includes details on adapter physical characteristics, LED operation, environmental requirements, and power requirements. Also included are Fibre Channel standards, regulatory, and safety compliance information.

- Chapter 6, "Adapter Support" provides details on information to provide your QLogic adapter support provider for hardware, firmware, and software support, including product repairs and part ordering. This chapter also provides an overview of using the Support Save feature to collect debug information from the driver, internal libraries, and firmware so that you can pass this to your provider for more efficient problem resolution.
- Appendix A, "Adapter Configuration" is optional for expert network administrators, who need to modify values for adapter instance-specific persistent and driver-level configuration parameters.
- Appendix B, "MIB Reference" provides information on the MIB groups and objects that support the Simple Network Management Protocol (SNMP) for CNAs and Fabric Adapter ports configured in CNA mode.

Figure i illustrates a flowchart of how to use chapters in this manual to install and configure adapters.

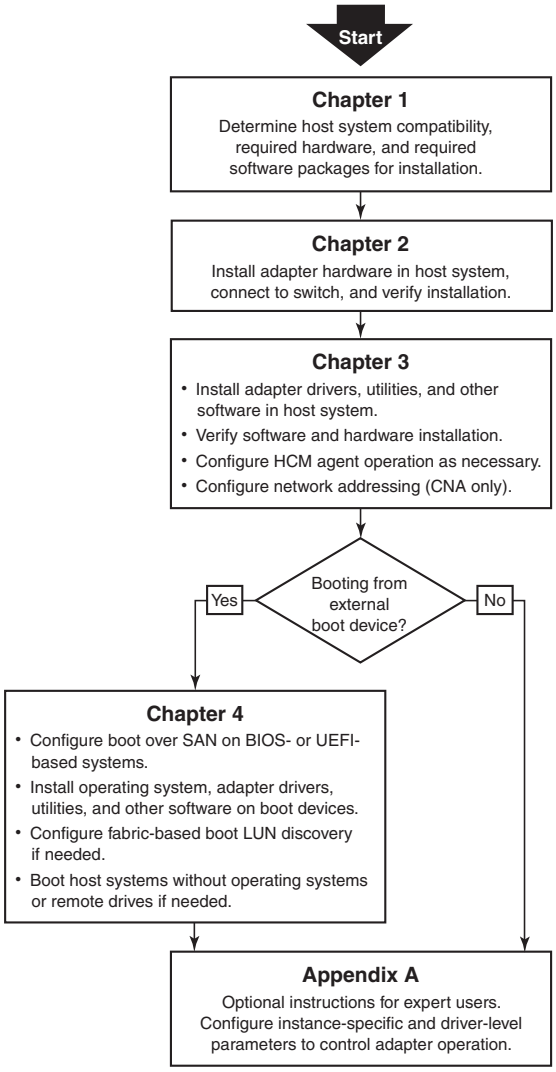

Start
Chapter 1
Determine host system compatibility, required hardware, and required software packages for installation.
Chapter 2
Install adapter hardware in host system, connect to switch, and verify installation.
Chapter 3
• Install adapter drivers, utilities, and other software in host system.
• Verify software and hardware installation.
• Configure HCM agent operation as necessary.
• Configure network addressing (CNA only).
Booting from external boot device?
Yes
No
Chapter 4
• Configure boot over SAN on BIOS- or UEFI-based systems.
• Install operating system, adapter drivers, utilities, and other software on boot devices.
• Configure fabric-based boot LUN discovery if needed.
• Boot host systems without operating systems or remote drives if needed.
Appendix A
Optional instructions for expert users. Configure instance-specific and driver-level parameters to control adapter operation.

Figure i. Installing adapters using this document

Related Materials

For information about downloading documentation from the QLogic Web site, see “Downloading Updates” on page xx.

Documentation Conventions

This guide uses the following documentation conventions:

- **NOTE** provides additional information.
- **CAUTION** without an alert symbol indicates the presence of a hazard that could cause damage to equipment or loss of data.
- Text in blue font indicates a hyperlink (jump) to a figure, table, or section in this guide, and links to Web sites are shown in underlined blue. For example:
  - Table 9-2 lists problems related to the user interface and remote agent.
  - See "Installation Checklist" on page 6.
  - For more information, visit www.qlogic.com.
- Text in **bold** font indicates user interface elements such as command names, keywords, operands and text to enter in the GUI or CLI. For example:
  - Click the **Start** button, point to **Programs**, point to **Accessories**, and then click **Command Prompt**.
  - Under **Notification Options**, select the **Warning Alarms** check box.
- Text in `Courier` font indicates a file name, directory path, or command line text. For example:
  - To return to the root directory from anywhere in the file structure: Type `cd /root` and press ENTER.
  - Enter the following command: `sh ./install.bin`
- Key names and key strokes are indicated with UPPERCASE:
  - Press CTRL+P.
  - Press the UP ARROW key.
- Text in *italics* indicates terms, emphasis, variables, or document titles. For example:
  - For a complete listing of license agreements, refer to the *QLogic Software End User License Agreement*.
  - What are *shortcut keys*?
  - To enter the date type *mm/dd/yyyy* (where *mm* is the month, *dd* is the day, and *yyyy* is the year).

- Topic titles between quotation marks identify related topics either within this manual or in the online help, which is also referred to as *the help system* throughout this document.
- Command line interface (CLI) command syntax conventions include the following:
  - < > (angle brackets) indicate a variable whose value you must specify. For example:
    - `<serial_number>`

    NOTE

    For CLI commands only, variable names are always indicated using angle brackets instead of *italics*.
  - [ ] (square brackets) indicate an optional parameter. For example:
    - `[<file_name>]` means specify a file name, or omit it to select the default file name.
  - | (vertical bar) indicates mutually exclusive options; select one option only. For example:
    - `on|off`
    - `1|2|3|4`
  - ... (ellipsis) indicates that the preceding item may be repeated. For example:
    - `x...` means *one* or more instances of `x`.
    - `[x...]` means *zero* or more instances of `x`.
  - ( ) (parentheses) and { } (braces) are used to avoid logical ambiguity. For example:
    - `a|b c` is ambiguous
      `{(a|b) c}` means `a or b`, followed by `c`
      `{a|(b c)}` means either `a,` or `b c`

License Agreements

Refer to the *QLogic Software End User License Agreement* for a complete listing of all license agreements affecting this product.

Technical Support

Customers should contact their authorized maintenance provider for technical support of their QLogic products. QLogic-direct customers may contact QLogic Technical Support; others will be redirected to their authorized maintenance provider. Visit the QLogic support Web site listed in Contact Information for the latest firmware and software updates.

For details about available service plans, or for information about renewing and extending your service, visit the Service Program Web page at http://www.qlogic.com/Support/Pages/ServicePrograms.aspx.

Downloading Updates

The QLogic Web site provides periodic updates to product firmware, software, and documentation.

To download firmware, software, and documentation:

1. Go to the QLogic Downloads and Documentation page: http://driverdownloads.qlogic.com.
2. Type the QLogic model name in the search box.
3. In the search results list, locate and select the firmware, software, or documentation for your product.
4. View the product details Web page to ensure that you have the correct firmware, software, or documentation. For additional information, click **Read Me** and **Release Notes** under Support Files.
5. Click **Download Now**.
6. Save the file to your computer.
7. If you have downloaded firmware, software, drivers, or boot code, follow the installation instructions in the *Readme* file.

Instead of typing a model name in the search box, you can perform a guided search as follows:

1. Click the product type tab: **Adapters**, **Switches**, **Routers**, or **ASICs**.
2. Click the corresponding button to search by model or operating system.
3. Click an item in each selection column to define the search, and then click **Go**.
4. Locate the firmware, software, or document you need, and then click the item's name to download or open the item.

Training

QLogic Global Training maintains a Web site at www.qlogictraining.com offering online and instructor-led training for all QLogic products. In addition, sales and technical professionals may obtain Associate and Specialist-level certifications to qualify for additional benefits from QLogic.

Contact Information

QLogic Technical Support for products under warranty is available during local standard working hours excluding QLogic Observed Holidays. For customers with extended service, consult your plan for available hours. For Support phone numbers, see the Contact Support link at support.qlogic.com.

Support Headquarters	QLogic Corporation 4601 Dean Lakes Blvd. Shakopee, MN 55379 USA
QLogic Web Site	www.qlogic.com
Technical Support Web Site	http://support.qlogic.com
Technical Support E-mail	support@qlogic.com
Technical Training E-mail	training@qlogic.com

Knowledge Database

The QLogic knowledge database is an extensive collection of QLogic product information that you can search for specific solutions. QLogic is constantly adding to the collection of information in the database to provide answers to your most urgent questions. Access the database from the QLogic Support Center: http://support.qlogic.com.

1 Product Overview

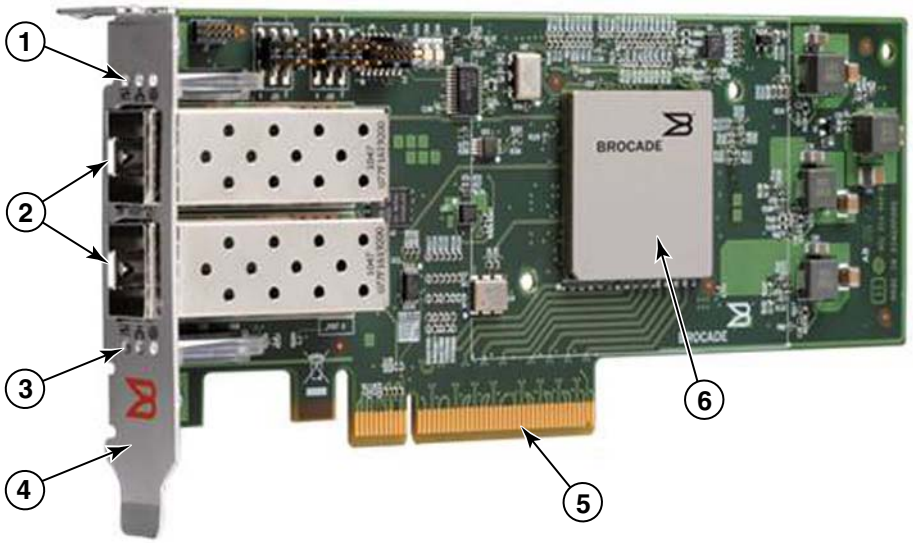
Fabric Adapters

The BR-1860 stand-up Fabric Adapter is a low-profile MD2 form-factor PCI Express (PCIe) card measuring 16.751 cm by 6.878 cm (6.595 in. by 2.708 in.) that installs in standard host computer systems. Figure 1-1 illustrates major components of the dual-port BR-1860 Fabric Adapter. BR-1860 single- or dual-port adapter models can ship with the following configurations of small form-factor pluggable (SFP) transceivers:

- Single-port model - 16 Gbps Fibre Channel SFP+ transceiver, 10GbE SFP+ transceiver, or without optics.
- Dual-port model - Two 16 Gbps Fibre Channel SFP+ transceiver, two 10GbE SFP+ transceivers, or without optics.

Although adapters may ship with specific optics (or no optics) installed, you can replace with compatible optics, such as 8 Gbps FC SFP transceivers, long-wave SFP transceivers, and SFP+ direct-attach copper cables. Refer to “Hardware compatibility” on page 5 for more information.

Note that the following illustration is representative and may have minor physical differences from the card that you purchased.



1 LEDs for port 1 SFP transceiver.

2 Cable connectors for port 1 and port 0 SFP transceiver (Fiber-optic SFP illustrated).

3 LEDs for port 0 SFP transceiver.

4 Low-profile mounting bracket.

Note: The adapter ships with the standard (full-height) mounting bracket installed.

5 PCIe x8 connector.

6 ASIC

Figure 1-1. BR-1860 Fabric Adapter (heat sink removed)

NOTE

Use only Brocade®-branded SFP+ laser transceivers supplied with stand-up Fabric Adapters.

AnyIO™ technology

Although the BR-1860 can be shipped in a variety of SFP transceiver configurations, you can change the port function to the following modes using the QLogic AnyIO™ technology, provided the correct SFP transceiver is installed for the port:

- **HBA or Fibre Channel mode**. This mode utilizes the QLogic Fibre Channel storage driver. An 8 or 16 Gbps Fibre Channel SFP transceiver can be installed for the port. The port provides host bus adapter functions on a single port so that you can connect your host system to devices on the Fibre Channel SAN. Ports with 8 Gbps SFP transceivers configured in HBA mode can operate at 2, 4, or 8 Gbps. Ports with 16 Gbps SFP+ transceivers configured in HBA mode can operate at 4, 8, or 16 Gbps.

  Fabric Adapter ports configured in HBA mode appear as “FC” ports when discovered in HCM. They appear as “FC HBA” to the operating system.

  NOTE

  The terms “Fibre Channel mode” and “HBA mode” may be used interchangeably in this document.

- **Ethernet or NIC mode**. This mode utilizes the QLogic network driver. A 10 GbE SFP transceivers or direct-attach SFP+ transceiver copper cable must be installed for the port. This mode supports basic Ethernet, Data Center Bridging (DCB), and other protocols that operate over DCB to provide functions on a single port that are traditionally provided by an Ethernet Network Interface Card (NIC). Ports configured in this mode can operate at up to 10 Gbps. Fabric Adapters that ship from the factory with 10GbE SFP transceivers installed or no SFP transceivers installed are configured for Ethernet mode by default.

  Fabric Adapter ports set in NIC mode appear as Ethernet ports when discovered in HCM. These ports appear as “10 GbE NIC” to the operating system.

  NOTE

  The terms “Ethernet mode” and “NIC mode” may be used interchangeably in this document.

- **CNA mode**. This mode provides all the functions of Ethernet or NIC mode, and adds support for FCoE features by utilizing the QLogic FCoE storage driver. A 10 GbE SFP transceivers or direct-attach SFP+ transceiver copper cable must be installed for the port. Ports configured in CNA mode connect to a switch that supports Data Center Bridging (DCB). These ports provide

all traditional CNA functions for allowing Fibre Channel traffic to converge onto 10 Gbps DCB networks. The ports even appear as network interface cards (NICs) and Fibre Channel adapters to the host. FCoE and 10 Gbps data center bridging (DCB) operations run simultaneously.

Fabric Adapter ports set in CNA mode appear as FCoE ports when discovered in HCM. These ports appear as “10 GbE NIC” to the operating system.

Changing the port mode

You can change the mode of individual ports on an adapter using the following methods:

- BCU commands:
  - The **bcu port - -mode** command allows you to change the mode of individual ports on the adapter.
  - The **bcu adapter - -mode** command allows you to change all ports on the adapter to a specific mode.
- HCM **Fabric Adapter** port menu.
- UEFI setup screens for the QLogic BR-Series Adapter. Changing the port mode through UEFI is only supported on Fabric Adapters.

For more information on using BCU commands and HCM, refer to the *QLogic BR Series Adapter Administrator’s Guide*. For more information on using UEFI setup screens for the QLogic BR-Series Adapter, refer to “Configuring UEFI” on page 255.

As general steps to change a port’s operating mode, perform the following steps:

1. Change the mode using BCU commands, HCM, or UEFI setup screens.
2. Make sure the appropriate SFP (FC or 10 GbE) transceiver and driver packages are installed to operate the port in the selected mode if they are not already installed. Refer to Table 1-10 on page 83 for information on drivers.
3. Power-cycle the host system.

   Dynamically changing the port mode is equivalent to plugging in a new device in the system, so the system must be power-cycled for this configuration change to take effect.

NOTE

For Windows® systems, you must install the drivers for the new mode after the system is power-cycled. This is not required if the appropriate driver is already preinstalled in the system.

When you change the port mode, the port resets to factory defaults for physical functions (PFs) associated with the mode (refer to “Factory default PF configurations” on page 28). For details on configuring ports for different operating modes, refer to the *QLogic BR Series Adapter Administrator’s Guide*.

NOTE

The BR-1860 Adapter may be ordered with Fibre Channel or 10GbE transceivers. Depending on the transceiver installed, the port function may be set to a specific operating mode, such as HBA, NIC, or CNA. In some cases, the adapter may only support a specific operating mode and cannot be changed. Refer to your adapter provider for details.

Hardware compatibility

This section outlines important compatibility information.

SFP transceivers (stand-up adapters)

Use only the QLogic-branded small form-factor pluggable (SFP) transceivers described in this section for stand-up QLogic Fabric Adapters.

Ports configured in CNA or NIC mode

Table 1-1 provides the type, description, and switch compatibility information for supported SFP transceivers that can be installed in ports configured in CNA or NIC mode.

Table 1-1. Compatible SFP transceivers for ports configured in CNA or NIC mode

SFP transceiver type	Description	Switch compatibility
10 Gbps SR (short range) SFP+ transceiver, 1490 NM	Optical short range SFP+ transceiver. Distance depends on cable type. Refer to “Cabling (stand-up adapters)” on page 272.	Any switch compatible with the adapter
10 Gbps LR (long range) SFP+ transceiver, 10 km. 1310 NM	Optical long range SFP+ transceiver for fiber-optic cable 10 km (6.2 mi.)	Any switch compatible with the adapter
1 meter direct-attached SFP+ transceiver copper cable	SFP+ transceiver with twinaxial copper cable 1-meter (3.2 feet) maximum	Any switch compatible with the cable.
3 meter direct-attached SFP+ transceiver copper cable	SFP+ transceiver for twinaxial copper cable 3 meters (9.8 feet) maximum	Any switch compatible with the cable.
5 meter direct-attached SFP+ transceiver copper cable	SFP+ transceiver for twinaxial copper cable 5 meters (16.4 feet) maximum	Any switch compatible with the cable.

NOTE

For adapters releases 3.0.3.0 and later, QLogic BR-Series Adapters allow non-Brocade active twinaxial cables (based on supported switches), although non-Brocade cables have not been tested.

Ports configured in HBA mode

Table 1-2 provides the type, description, and switch compatibility information for supported SFP transceivers that can be installed in ports configured in HBA mode.

Table 1-2. Compatible SFP transceivers for ports configured in HBA mode

Type	Description	Switch Compatibility
8 Gbps SWL (short wave laser) SFP+ transceiver	SFP+ transceiver for fiber-optic cable Distance depends on cable type. Refer to “Cabling (stand-up adapters)” on page 272.	Any switch compatible with the adapter
8 Gbps LWL (long wave laser) 10 km SFP+ transceiver	SFP+ transceiver for fiber-optic cable Distance depends on cable type. Refer to “Cabling (stand-up adapters)” on page 272.	Any switch compatible with the adapter
16 Gbps SWL (short wave laser) SFP+ transceiver	SFP+ transceiver for fiber-optic cable Distance depends on cable type. Refer to “Cabling (stand-up adapters)” on page 272.	Any switch compatible with the adapter
16 Gbps LWL (long wave laser) 10 km SFP+ transceiver	SFP+ transceiver for fiber-optic cable Distance depends on cable type. Refer to “Cabling (stand-up adapters)” on page 272.	Any switch compatible with the adapter

PCI express connections

QLogic Fabric Adapters are compatible with PCI express (PCIe) connections that have the following specifications:

- x8 lane or greater transfer interface.
- Gen1 (PCI Base Specification 1.0, 1.01a, and 1.1).
- Gen2 (PCI Express Base Specification 2.0).
- Gen3 (PCI Express Base Specification 3.0)

NOTE

Install adapters in PCI express connectors with an x8 lane transfer interface or greater for best performance. You cannot install Fabric Adapters in PCI or PCI-X connectors.

Host systems and switches

Support for Fabric Adapter ports depends on the mode (CNA, HBA, or NIC) in which they are configured:

- Ports on Fabric Adapters configured in CNA mode can connect to Fibre Channel SANs and Ethernet data networks through a compatible switch that supports Data Center Bridging (DCB) These ports can also connect to a standard Ethernet LAN switch.
- Ports configured in HBA mode support Fabric OS® and connect to SANs through fabric switches or connect directly to Fibre Channel storage arrays.
- Ports configured in NIC mode fully support the Ethernet protocol and connect directly to the Ethernet LAN.

Storage systems

Using Fabric Adapter ports configured in HBA mode, you can connect a server (host system) to a Fibre Channel SAN in a switched fabric and point-to-point topology or directly to a storage array in a point-to-point or Fibre Channel Arbitrated Loop (FC-AL) topology.

Using Fabric Adapter ports configured in CNA mode, you can connect a server (host system) to a Fibre Channel SAN through connection with a switch that supports Data Center Bridging (DCB).

Converged Network Adapters

Table 1-3 describes available QLogic FCoE PCIe Converged Network Adapters (CNAs) for PCIe x8 host bus interfaces, hereafter referred to as QLogic CNAs. These adapters provide reliable, high-performance host connectivity for mission-critical SAN environments. Provided in the table are the model number, port speed, number of ports, and adapter type for each CNA.

Table 1-3. QLogic Fibre Channel CNAs

Model number	Port speed	Number of ports	Adapter type
BR-1007	10 Gbps maximum	2	Mezzanine
BR-1020	10 Gbps maximum	2	Stand-up
BR-1741	10 Gbps maximum	2	Mezzanine

Two types of CNAs are available:

- Stand-up adapters.

  These are low-profile MD2 form factor PCI Express (PCIe) cards, measuring 16.76 cm by 6.89 cm (6.6 in. by 2.71 in.) that install in PCIe connectors in standard host systems.

- Mezzanine adapters.

  These are smaller cards that mount on server blades that install in blade system enclosures. The enclosures contain other system blades, such as switch and pass-through modules.

CNA ports connect to a switch that supports Data Center Bridging (DCB). CNAs combine the functions of a host bus adapter and Network Interface Card (NIC) on one PCIe x8 card. The CNAs even appear as network interface cards (NICs) and Fibre Channel adapters to the host. These CNAs fully support FCoE protocols and allow Fibre Channel traffic to converge onto 10 Gbps Data Center Bridging (DCB) networks. FCoE and 10 Gbps DCB operations run simultaneously.

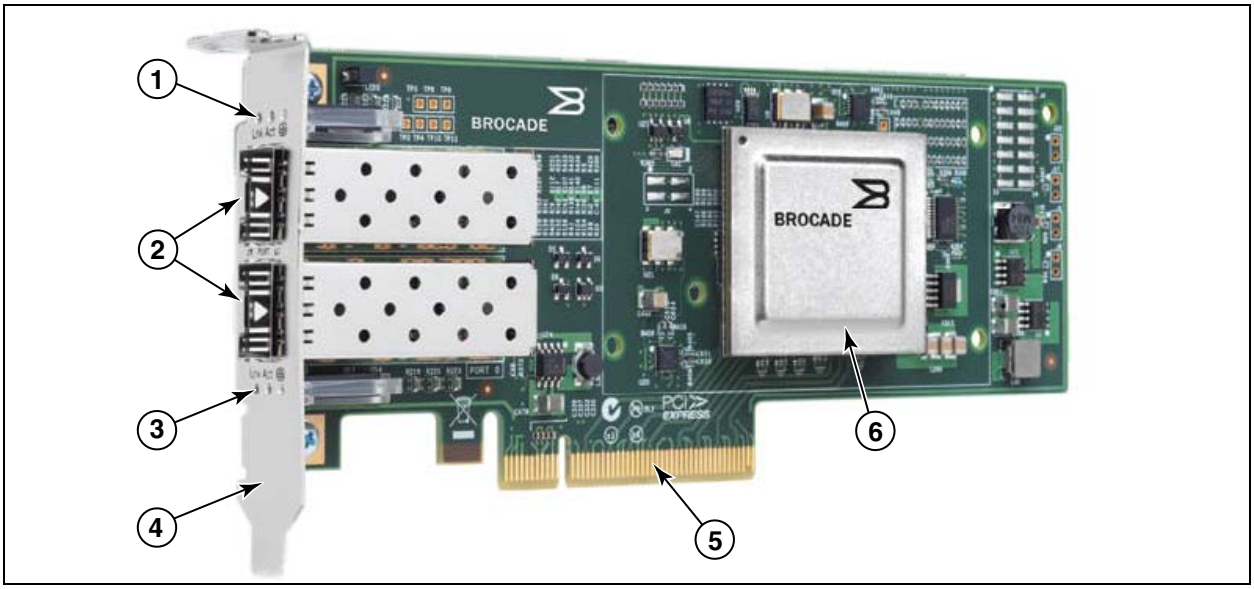
The combined high performance and proven reliability of a single-ASIC design makes these CNAs ideal for connecting host systems on Ethernet networks to SAN fabrics based on QLogic Fabric or M-Enterprise operating systems.!

Stand-up adapters

Stand-up type CNAs, such as the BR-1020, are low-profile MD2 form factor PCI Express (PCIe) cards that install in standard host computer systems. Figure 1-2 on page 10 illustrates major components of the BR-1020 stand-up CNA with two fiber optic small form factor pluggable (SFP) transceivers installed. Both stand-up CNAs also support direct-attached SFP+ transceiver copper cables.

NOTE

The following illustration is representative and may have minor physical differences from the card that you purchased.



1	LEDs for port 1 SFP transceiver
2	Cable connectors for port 1 and port 0 SFP transceivers (Fiber-optic SFP transceiver illustrated)
3	LEDs for port 0 SFP transceiver
4	Low-profile mounting bracket. **Note:** The CNA ships with the low-profile mounting bracket installed.
5	PCIe x8 connector
6	ASIC

Figure 1-2. BR-1020 stand-up CNA with low-profile mounting bracket (heat sink removed)

NOTE

Use only QLogic-branded SFP+ laser transceivers supplied with stand-up CNAs.

Mezzanine adapters

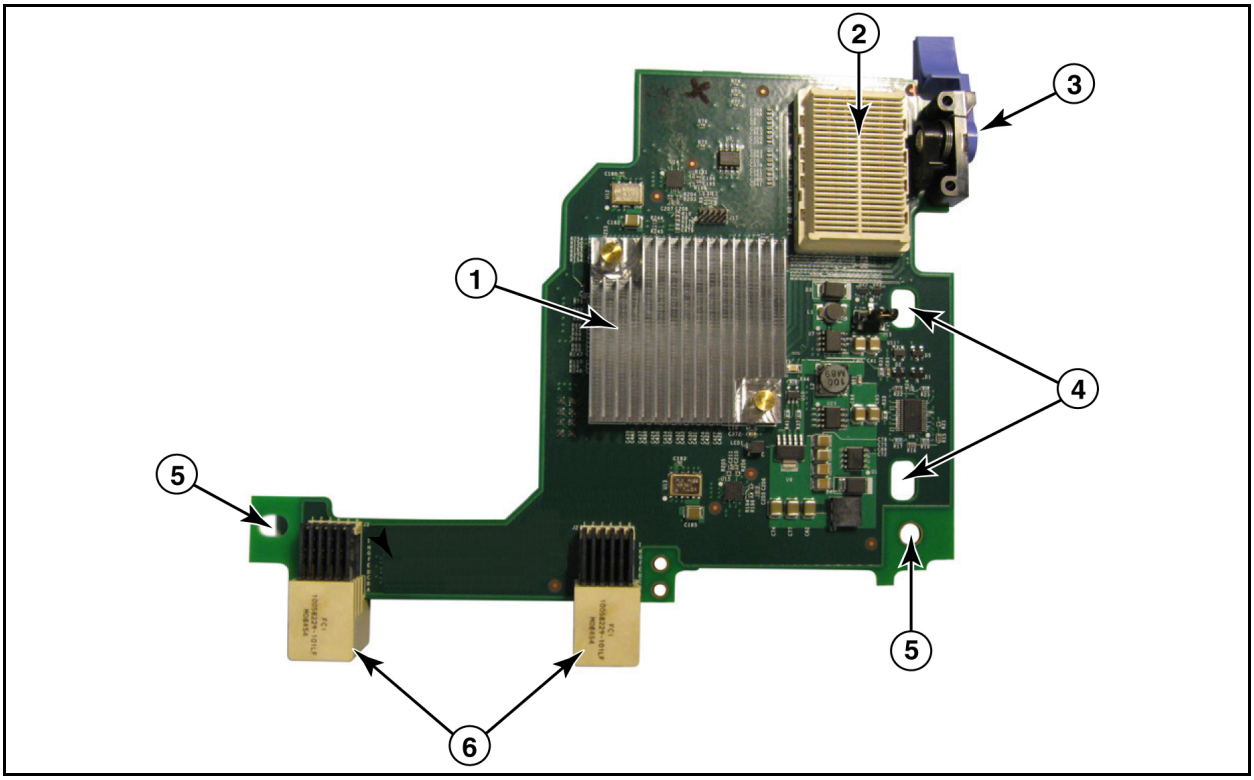
Mezzanine adapters are smaller modules than stand-up models. These mount on server blades that install in blade system enclosures.

BR-1007 CNA

Figure 1-3 illustrates major components of the BR-1007, which is an IBM combo form factor horizontal (CFFh) CNA containing two ports operating at 10 Gbps.

NOTE

The following illustration is representative and may have minor physical differences from the card that you purchased.



1	ASIC with heat sink
2	x8 PCIe interface connector.
3	Release lever. Pull to release adapter from blade server.
4	Holes for guiding card onto blade server system board mounting posts.
5	Holes for guiding card onto blade server system board mounting posts.
6	Midplane connectors

Figure 1-3. BR-1007 CNA

NOTE

Labels showing the part number, PWWNs, port MAC addresses, model number, and serial number for the BR-1007 CNA are on the reverse (top) side of the card.

The BR-1007 mounts on a server blade that installs in an IBM BladeCenter® enclosure. The adapter uses FCoE to converge standard networking and storage data onto a shared Ethernet link. Ethernet and Fibre Channel communications are routed through the DCB ports on the adapter to the blade system enclosure midplane, and then onto switch modules installed in the enclosure.

For information on installing the BR-1007 CNA on a server blade, refer to 2, "Hardware Installation". For additional information related to the supported blade server, blade system enclosure, and other devices installed in the enclosure such as I/O modules and switch modules, refer to the installation instructions provided with these products.

WoL and SoL limitations

The following describes limitations of support for Wake on LAN (WoL) and Serial over LAN (SoL) for the BR-1007 adapter:

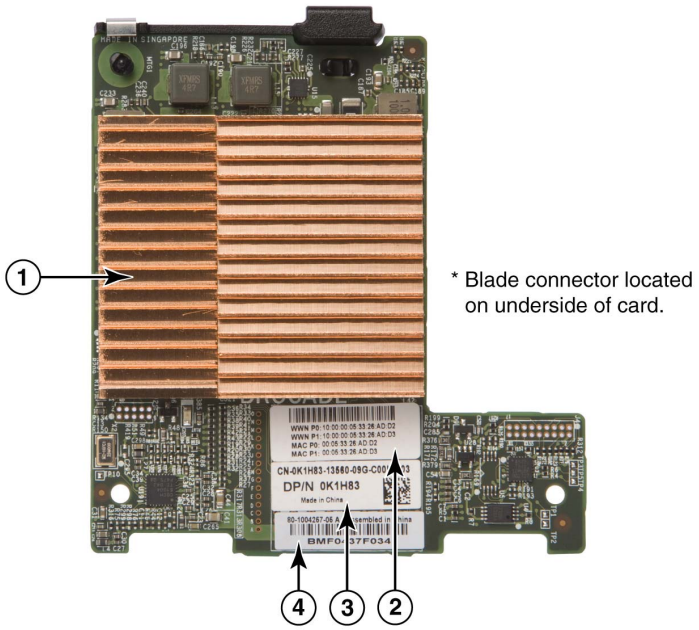
- WoL. The adapter does not support WoL over its 10 GbE links. WoL is supported using the IBM BladeCenter 1 GbE NIC included on the IBM server blades.
- SoL. The adapter does not support SoL over its 10 GbE links. SoL is supported using the IBM 1 GbE NIC included on the IBM server blades.

BR-1741 CNA

Figure 1-4 illustrates the major components of the BR1741M-k 2P Mezz Card, also known as the BR-1741 CNA. This is a small form factor (SFF) mezzanine card containing two ports operating at 10 Gbps that mounts on a Dell blade server.

NOTE

The following illustration is representative and may have minor physical differences from the card that you purchased.



1	ASIC with heat sink
2	Port WWN and MAC address label
3	OEM PPID and part number label
4	QLogic serial number label

Figure 1-4. BR-1741 mezzanine card

The BR-1741 mounts on supported blade servers that install in Dell™ PowerEdge™ M1000e modular blade systems. It is used in conjunction with matching I/O modules, also installed in the blade enclosure. The adapter uses FCoE to converge standard data and storage networking data onto a shared Ethernet link. Ethernet and Fibre Channel communications are routed through the DCB ports on the adapter to the enclosure backplane, and then to the I/O module.

For information on installing the BR-1741 CNA on a blade server, refer to 2, "Hardware Installation". For additional information related to the supported server blade, blade enclosure, and other devices installed in the enclosure such as I/O and switch modules, refer to the installation instructions provided with these products.

Hardware compatibility

This section outlines important compatibility information.

SFP transceivers (stand-up adapters)

Use only the Brocade-branded small form-factor pluggable (SFP) transceivers described in Table 1-4 in BR-Series stand-up CNAs. The table provides the type, description, and switch compatibility information for supported SFP transceiver.

Table 1-4. Compatible SFP transceivers for QLogic stand-up CNAs

SFP transceiver type	Description	Switch compatibility
10 Gbps SR (short range) SFP+ transceiver, 1490 NM	Optical short range SFP+ transceiver for Distance depends on cable type. Refer to "Cabling (stand-up adapters)" on page 282.	Any switch compatible with the adapter
10 Gbps LR (long range) SFP+ transceiver, 10 km, 1310 NM	Optical long range SFP+ transceiver for fiber optic cable 10 km (6.2 mi.)	Any switch compatible with the adapter
1 meter direct-attached SFP+ transceiver copper cable	SFP+ transceiver with twinaxial copper cable 1 meter (3.2 feet) maximum	Any switch compatible with the cable.
3 meter direct-attached SFP+ transceiver copper cable	SFP+ transceiver with twinaxial copper cable 2 meters (9.8 feet) maximum	Any switch compatible with the cable.
5 meter direct-attached SFP+ transceiver copper cable	SFP+ transceiver with twinaxial copper cable 5 meters (16.4 feet) maximum	Any switch compatible with the cable.

NOTE

For adapters releases 3.0.3.0 and later, active twin-axial copper cables supplied by vendors other than QLogic can be used, but the cables are not supported.

Host systems and switches (stand-up adapters)

QLogic CNAs must connect to Fibre Channel SANs and Ethernet data networks through a compatible switch that supports Data Center Bridging (DCB).

Server blades and system enclosures (mezzanine adapters)

Consider the following points when installing mezzanine adapters in blade servers and system enclosures or chassis:

- For information about the system enclosures and enclosure components, such as server blades, I/O modules, switch modules, and optional devices that are compatible with the adapter, visit the manufacturer websites for these products. You can also contact your server blades or system enclosure marketing representative or authorized reseller.
- To support each I/O module that you install in the system enclosure, you may also need to install a compatible adapter in each server blade that you want to communicate with the I/O module. Also, the adapter may only support switch modules or blades in specific I/O bays of the enclosure. For additional information, refer to installation and user guides and the interoperability guides provided for the blade server and system enclosure.
- The QLogic mezzanine adapter is compatible with the following types of modules that install in the supported blade system enclosure:
  - Pass-thru modules
  - I/O modules
  - Switch modules

NOTE

For detailed information about these modules, see the installation and user guides and interoperability guides provided for these modules and the blade system enclosure.

- The maximum number of adapters that you can install in the system enclosure varies according to the type of enclosure that you are using because each type may support a different number of server blades. For additional compatibility information, see the installation, user, and interoperability guides provided for the blade server and the system enclosure.

PCI express connections

QLogic CNAs are compatible with PCI express (PCIe) connections that have the following specifications:

- x8 lane or greater transfer interface
- Gen1 (PCI Base Specification 1.0, 1.01a, and 1.1)
- Gen2 (PCI Express Base Specification 2.0)
- Gen3 (PCI Express Base Specification 3.0)

NOTE

Install CNAs in PCI express connectors with an x8 lane transfer interface or greater for best performance. You cannot install CNAs in PCI or PCI-X connectors.

Storage systems

Using QLogic CNAs, you can connect a server (host system) to a Fibre Channel SAN through connection with a compatible switch that supports Data Center Bridging (DCB).

NOTE

The CNA can connect with a network switch and perform NIC functions for network traffic.

Host Bus Adapters

Table 1-5 provides the model number, port speed, number of ports, and adapter type for the current QLogic Fibre Channel PCIe host bus adapters. These adapters provide reliable, high-performance host connectivity for mission-critical SAN environments.

Table 1-5. Host bus adapter model information

Model number	Port speed	Number of ports	Adapter type
BR-804	8 Gbps maximum	2	Mezzanine
BR-815	8 Gbps maximum[1]	1	Stand-up
BR-825	8 Gbps maximum[1]	2	Stand-up
BR-1867	16 Gbps maximum	2	Mezzanine
BR-1869	16 Gbps maximum	4	Mezzanine

1. A 4 Gbps SFP transceiver installed in BR-815 or BR-825 host bus adapters allows 4, 2, or 1 Gbps.

Two types of host bus adapters are available:

- Stand-up adapters.

  These are low-profile MD2 form factor PCI Express (PCIe) cards, measuring 16.76 cm by 6.89 cm (6.6 in. by 2.71 in), that install in PCIe connectors in standard host systems.

- Mezzanine adapters.

  These are smaller cards that mount on server blades that install in blade system chassis. Fibre Channel communications are routed through the adapter ports on the blade server to the blade system enclosure midplane and onto the installed switch modules installed in the chassis.

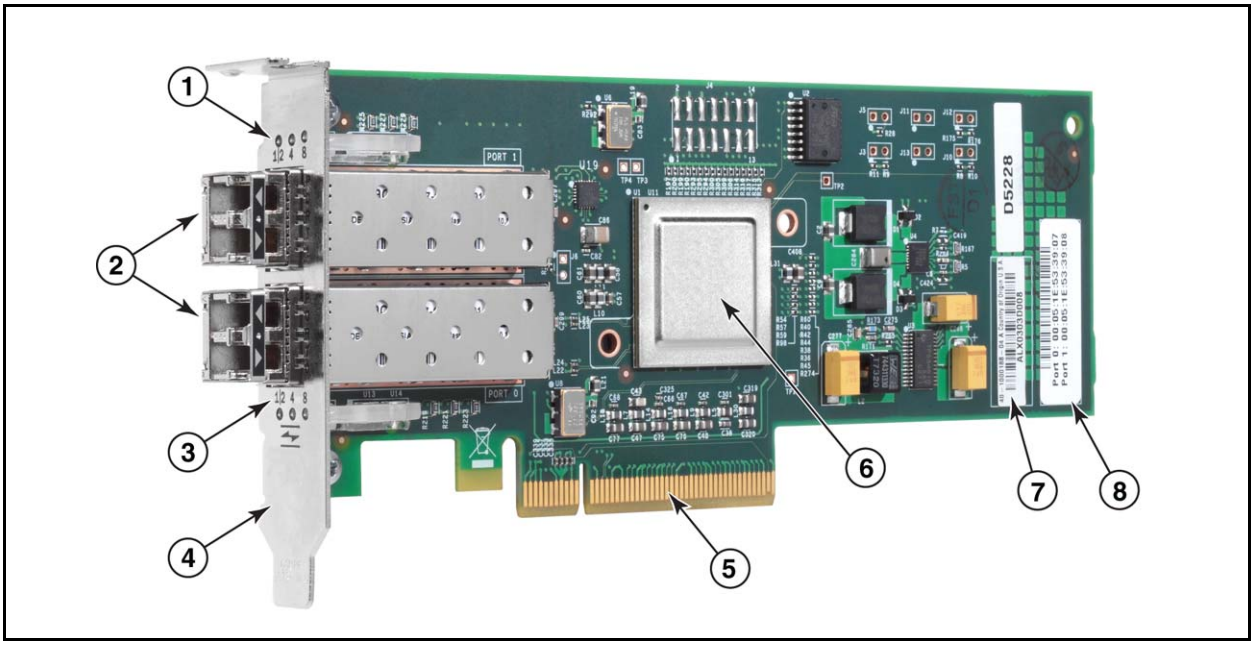
Using QLogic host bus adapters, you can connect your host system to devices on the Fibre Channel SAN. The combined high performance and proven reliability of a single-ASIC design makes these host bus adapters ideal for connecting hosts to SAN fabrics based on QLogic Fabric or M-Enterprise operating systems.

Stand-up adapters

Figure 1-5 illustrates major components of the BR-825 stand-up model host bus adapter.

NOTE

The following illustration is representative and may have minor physical differences from the host bus adapter that you purchased.



1 LEDs for port 1 SFP transceiver

2 Fiber-optic cable connectors for port 1 and port 0 SFP transceivers

3 LEDs for port 0 SFP transceivers

4 Low-profile mounting bracket.

Note: The host bus adapter ships with the low-profile mounting bracket installed.

5 PCIe x8 PCIe connector

6 ASIC

7 Serial number label

8 Label showing PWWN for each port.

Figure 1-5. BR-825 Host bus adapter with low-profile mounting bracket (heat sink removed)

NOTE

Use only Brocade-branded SFP laser transceivers supplied with stand-up adapters.

Mezzanine adapters

Mezzanine Fabric Adapters are smaller than stand-up modules. For example, the BR-804 adapter measures approximately 4 in. by 4.5 in. (10.16 cm by 11.43 cm).

Mezzanine adapters mount in blade servers that install in supported blade system chassis. Refer to the "Server blades and system enclosures (mezzanine adapters)" on page 16 for references for Fabric Adapter compatibility information. Note that mezzanine Fabric Adapters do not have external port connectors with optics such as stand-up adapters, but internal ports that connect to switch and I/O modules installed in the blade system chassis through high-speed links in the internal chassis or enclosure backplane.

Three models of host bus mezzanine adapters are available:

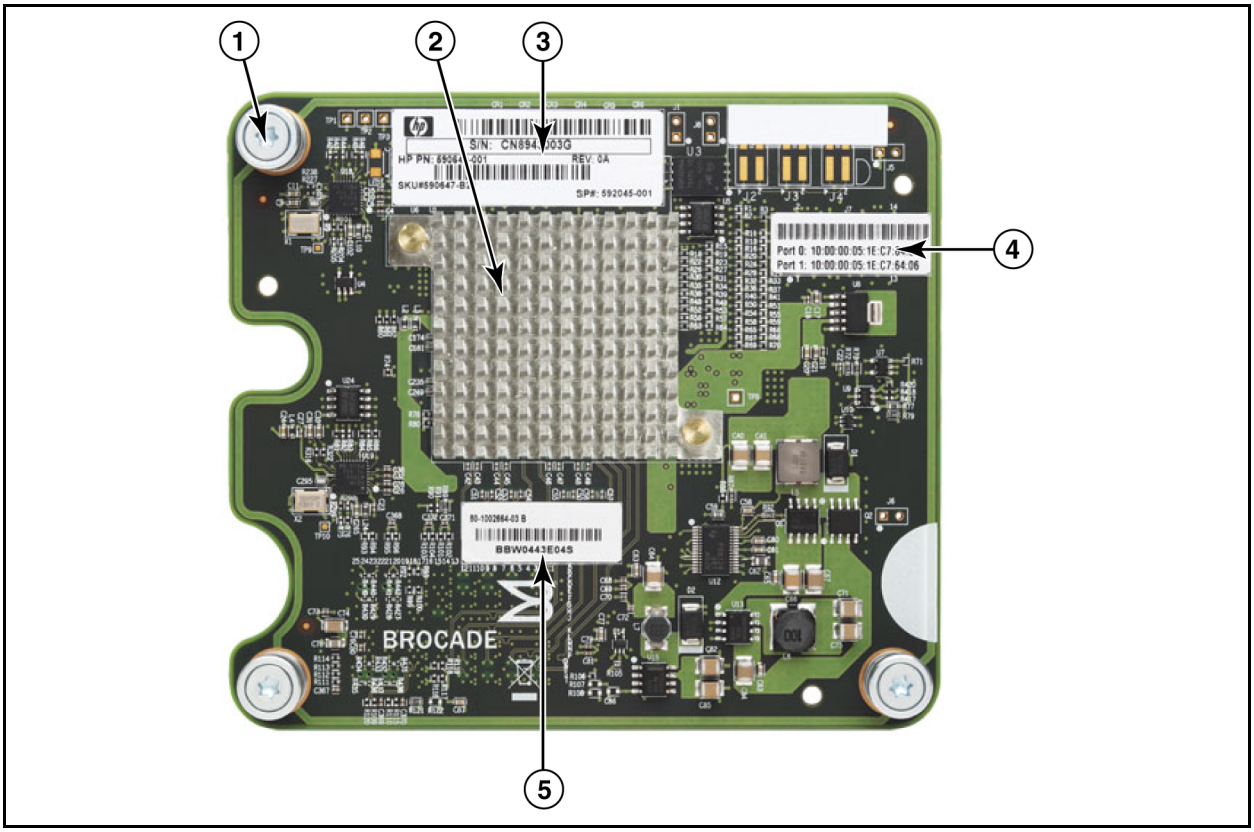
- BR-804
- BR-1867
- BR-1869

BR-804 host bus adapter

Figure 1-6 illustrates major components of the BR-804 mezzanine host bus adapter. This mezzanine card installs in supported blade servers that install in Hewlett Packard® BladeSystem® c-Class enclosures.

NOTE

The following illustration is representative and may have minor physical differences from the host bus adapter that you purchased.



1 Mounting screws

2 ASIC

3 OEM serial and part number

4 PWWNs for adapter ports

5 QLogic serial and part number

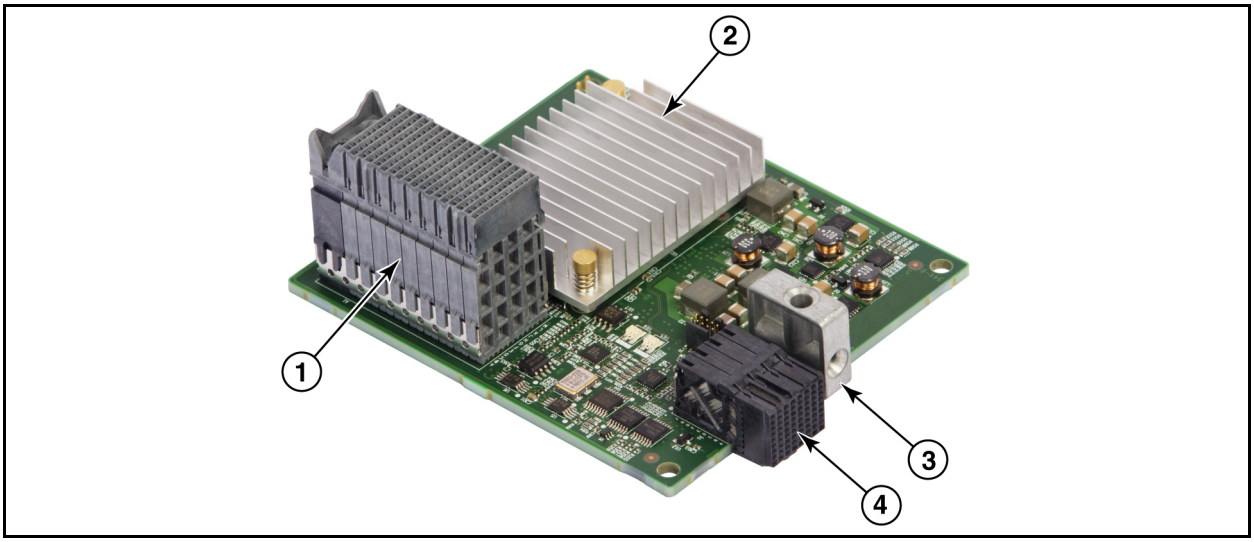
Figure 1-6. BR-804 mezzanine host bus adapter

BR-1867 host bus adapter

Figure 1-7 illustrates major components of the BR-1867, an host bus adapter mezzanine adapter containing two Fibre Channel ports operating at 16 or 8 Gbps. The adapter measures 10.65 cm (4.19 inches) deep, 8.49 cm (3.34 inches) wide, and 4.15 cm (1.64 inches) high.

NOTE

The following illustration is representative and may have minor physical differences from the card that you purchased.



1	x8 PCIe interface connector
2	ASIC with heat sink
3	Connector guide
4	Midplane connector

Figure 1-7. BR-1867 host bus adapter (bottom view)

NOTE

Labels showing the part number, PWWNs, model number, and serial number for the BR-1867 host bus adapter are on the top side of the card (reverse from side shown in previous illustration).

The BR-1869 Adapter provides four Fibre Channel connections capable of providing 8 Gbps or 16 Gbps to devices on Fibre Channel (FC) SANs. Depending on the system configuration, the adapter provides up to 16 Gbps of full-duplex line-rate bandwidth per port.

The BR-1867 mounts on a compute node that installs in an IBM Flex System® chassis. Mezzanine adapters do not have external SFP transceivers and port connectors. Fibre Channel communications are routed through the internal ports on the adapter to the chassis midplane, and then onto switch modules installed in the chassis.

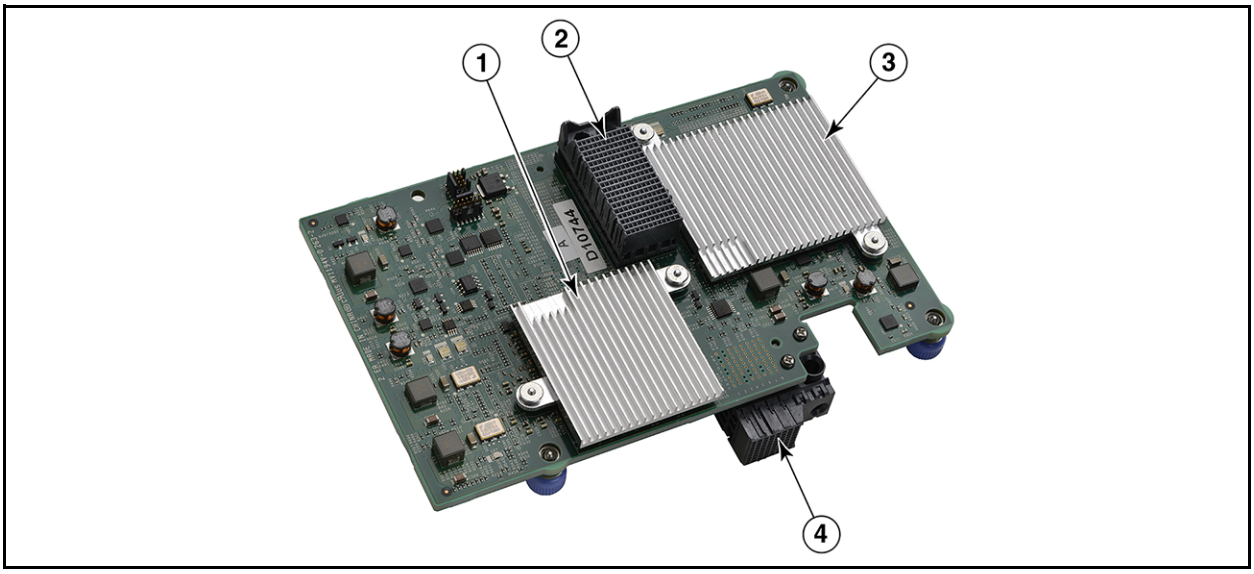
For information on installing the BR-1867 host bust adapter on a compute node, refer to 2, “Hardware Installation”. For additional information related to the supported compute node and other devices installed in the system chassis such as I/O modules and switch modules, refer to the installation instructions provided with these products.

BR-1869 host bus adapter

Figure 1-8 illustrates major components of the BR-1869, The adapter measures 157.9 mm (6.22 inches) deep, 107.8 mm (4.24 inches) wide, and 36.4 mm (1.43 inches) high.

NOTE

The following illustration is representative and may have minor physical differences from the card that you purchased.



1	ASIC with heat sink
2	x8 PCIe interface connector
3	ASIC with heat sink
4	Midplane connector

Figure 1-8. BR-1869 Host bus adapter (bottom view)

NOTE

Labels showing the part number, PWWNs, model number, and serial number for the BR-1869 host bus adapter are on the top side of the card (reverse from side shown in previous illustration).

The BR-1869 Adapter provides four Fibre Channel connections capable of providing 8 Gbps or 16 Gbps to devices on Fibre Channel (FC) SANs. Depending on the system configuration, the adapter provides up to 16 Gbps of full-duplex line-rate bandwidth per port.

The BR-1869 mounts on a compute node that installs in an IBM Flex System chassis. Mezzanine adapters do not have external SFP transceivers and port connectors. Fibre Channel communications are routed through the internal ports on the adapter to the chassis midplane, and then onto switch modules installed in the chassis.

The adapter contains two ASICs, each controlling two FC ports. These ports are split between two different compute nodes to provide dual, redundant paths between two switch elements. Adapter properties on a specific compute node will list only two available ports.

For information on installing the BR-1869 host bus adapter on a compute node, refer to Chapter 2, "Hardware Installation". For additional information related to the supported compute node and other devices installed in the system chassis such as I/O modules and switch modules, refer to the installation instructions provided with these products.

Hardware compatibility

This section outlines important compatibility information.

SFP transceivers (stand-up adapters)

Use only QLogic-branded small form factor pluggable (SFP) fiber optic 4 Gbps and 8 Gbps transceivers in the QLogic Fibre Channel stand-up host bus adapters.

NOTE

All BR-815 and BR-825 host bus adapters ship with the 8 Gbps SFP+ transceivers.

Host systems and switches (stand-up adapters)

QLogic host bus adapters connect to Fibre Channel SANs through compatible fabric switches or connect directly to Fibre Channel storage arrays.

Server blades and system enclosures and chassis (mezzanine adapters)

Consider the following information when installing and using QLogic host bus adapter mezzanine adapters.

BR-804 host bus adapters

The BR-804 mezzanine host bus adapter is compatible with blade servers, switch modules, interconnect modules, and other components that install in supported blade system enclosures. For details on blade servers and system enclosures that are compatible with this adapter, refer to the following:

- Manufacturer web sites for these products.
- Your blade server or blade system enclosure marketing representative or authorized reseller.

Documentation provided for your blade server, blade system enclosure, and enclosure components.

BR-1867 and BR-1869 host bus adapter

Consider the following points when installing these mezzanine adapters in compute nodes and Flex System chassis:

- Visit the manufacturer web sites for these products. In addition, you can also contact your compute node or system chassis marketing representative or authorized reseller.
- These mezzanine adapters are compatible with the devices that install in the supported system chassis such as the following:
  - ❑ Compute nodes
  - ❑ Pass-thru modules
  - ❑ I/O modules
  - ❑ Switch modules

NOTE

For detailed information about these modules, see the installation and user guides and interoperability guides provided for these modules and the blade system enclosure.

- The maximum number of adapters that you can install on a compute node or in the system chassis varies according to the type of chassis that you are using because each type of chassis may support a different number of compute nodes. For additional compatibility information, see the installation, user, and interoperability guides provided for the compute node and the system chassis.
- Use only driver update disk version 3.0.3.0 or later for compute nodes with the BR-1867 Fabric Adapter installed.
- Use only driver update disk version 3.2.1.0 or later for compute nodes with the BR-1869 Fabric Adapter installed.

PCI express connections

The QLogic Fibre Channel host bus adapters are compatible in PCI express (PCIe) connectors with the following specifications:

- x8 lane or greater transfer interface.
- Gen1 (PCI Base Specification 1.0, 1.01a, and 1.1).
- Gen2 (PCI Express Base Specification 2.0).
- Gen3 (PCI Express Base Specification 3.0).

NOTE

Install host bus adapters in PCI express (PCIe) connectors with an x8 lane transfer interface or greater for best performance. You cannot install host bus adapters in PCI or PCIx slots.

Storage systems

Using QLogic host bus adapters, you can connect a server (host system) to a Fibre Channel SAN in a switched fabric and point-to-point topology or directly to a storage array in a point-to-point topology.

Adapter features

QLogic BR-Series Adapters support the following general features for enhanced performance and connectivity in the SAN and Ethernet networks. For limitations and considerations for feature support for specific operating systems, refer to “Operating system considerations and limitations” on page 61.

- Fabric Adapters - Also refer to the following subsections depending on the port mode and SFP transceiver configurations:
  - “I/O virtualization” on page 28.
  - “Additional general features” on page 31
  - “FCoE features” on page 34, for ports configured in CNA mode.
  - “Data Center Bridging and Ethernet features” on page 38, for ports configured in CNA or NIC modes.
  - “Host bus adapter features” on page 49, for ports configured in HBA mode.

- CNAs - Also refer to the following subsections:
  - “I/O virtualization” on page 28.
  - “Additional general features” on page 31
  - “FCoE features” on page 34.
  - “Data Center Bridging and Ethernet features” on page 38.
- Host bus adapters - Also refer the following subsections:
  - “I/O virtualization” on page 28.
  - “Additional general features” on page 31
  - “Host bus adapter features” on page 49.

I/O virtualization

QLogic BR-Series Adapters support physical function-based I/O virtualization to provide data isolation and sharing of the bandwidth resources. Depending on the adapter model or the operating mode (CNA, HBA, or NIC) assigned to Fabric Adapter ports, from one to eight functions can be supported per port on the PCI bus. These physical functions (PFs) can be seen as multiple adapters by the host operating system or hypervisor.

Factory default PF configurations

For each type of adapter, each port has a set base or default physical function (PF) as follows:

- For host bus adapter models, each port has one Fibre Channel (FC) function.
- For CNA models, each port has one FCoE function and one Ethernet function.
- For Fabric Adapters, the default number of PFs depends on the mode configured for the port. Refer to Table 1-6.

Table 1-6. Factory default physical function (PF) configurations for Fabric Adapter ports.

Mode	PFs configured per port	PF configuration per port
HBA	1	FC
CNA	2	Ethernet and FCoE
NIC	1	Ethernet

vHBA

Virtual HBAs (vHBAs) are virtual port partitions that appear as virtual or logical host bus adapters to the host operating system. *vHBA* is the default PF associated with an host bus adapter port, the FCoE function on a CNA port or Fabric Adapter port configured in CNA mode, or a Fabric Adapter port configured in HBA mode. Additional vHBAs cannot be configured, and you cannot create or delete the default vHBA.

HCM discovers and displays all vHBAs as “FC.” For Fabric Adapter ports set in CNA mode, vHBAs display as “FCoE.”

The following are limitations of vHBAs:

- Multiple vHBAs per port are not supported.
- Target rate limiting (TRL) and Quality of Service (QoS) are not supported at the vHBA level (only at the physical port level).
- Boot over SAN is not supported at the vHBA level (only at the physical port level).

vNIC

Virtual Network Interface Cards (vNICs) are virtual port partitions that appear as virtual or logical NICs to the host operating system. HCM discovers and displays all vNICs for a physical port as “Eth.”

Following are limitations and considerations for vNICs:

- vNICs are supported on QLogic CNAs and on Fabric Adapter 10 GbE ports configured in CNA or NIC mode.
- You can create up to four vNICs on each Fabric Adapter port configured in NIC mode using the BCU **vnic - -create** command and through HCM options. You can delete vNICs using the **vnic - -delete** command or through HCM. For each Fabric Adapter port configured in CNA mode, you can only create up to three Ethernet PFs since the fourth PF must be used for FCoE.
- You cannot create or delete vNICs for QLogic CNA models, such as the BR-1020. Multiple vNICs are not supported on these models.
- Due to ESX memory limitations, a total of 4 vNICs in a VMware ESX system is supported.
- vNICs are not supported on QLogic host bus adapter modules.
- vNICs are not supported on Solaris® SPARC® systems.
- Multiple vNICs are not supported on QLogic CNA models, such as the BR-1020.
- For Windows, teaming is not supported between vNICs configured on the same physical port.

For each vNIC, you can configure bandwidth in increments of 100 Mbps using BCU commands, HCM, and BIOS/UEFI setup screens. The maximum bandwidth per vNIC is 10,000 Mbps. The maximum bandwidth per port is also 10,000 Mbps. Therefore, you can divide the 10,000 Mbps among all PFs configured. For example, if you configure four Ethernet PFs for a Fabric Adapter port, you can assign 2,500 Mbps per PF to reach the 10,000 Mbps maximum.

You can configure a minimum available bandwidth per vNIC partition. This bandwidth is guaranteed to be available on a port when other vNICs are contending for bandwidth on the port. Note the following for this feature:

- A zero value for the minimum bandwidth implies no guaranteed minimum bandwidth for the vNIC.
- The sum of minimum bandwidths for all vNICs on a port should be no more than the port's bandwidth.
- The minimum bandwidth should be no more than the maximum bandwidth for the vNIC.

As an example of minimum bandwidth configuration, vNIC1 is configured at 2 Gbps, vNIC2 at 4 Gbps, vNIC3 at 0 Gbps, and vNIC4 at 0 Gbps. In this case, vNIC1 and vNIC2 are guaranteed a minimum of 2 and 4 Gbps respectively, but no minimum is guaranteed for vNIC 3 and 4. When all four vNICs are trying to send data, the following is approximate what you can expect for minimum bandwidth in the steady state:

- vNIC1 = 2 + (10-2-4)/4 = 3 Gbps
- vNIC2 = 4 + (10-2-4)/4 = 5 Gbps
- vNIC3 = 0 + (10-2-4)/4 = 1 Gbps
- vNIC4 = 0 + (10-2-4)/4 = 1 Gbps

vHBA and vNIC BCU commands

Whether a port is configured for a single function or in the case of vNICs, multiple functions, each PF is assigned a PCI function ID (pcfid). This pcfid is used as a parameter in BCU commands to configure additional features or display information for that specific PF. For example, pcfid can be used in certain BCU debug, authentication, diagnostic, Ethernet port, lport, rport, VLAN, and FCP initiator mode commands, Specific vNIC and vHBA BCU commands are available for configuring vHBAs and vNICs. Examples of these commands follow:

- **vhba - -query <pcifn>** - Queries information about the virtual HBA.
- **vhba - -enable <pcifn>** - Enables a vHBA on a specified adapter port for a specified PF.
- **vhba – -disable <pcifn>** - Disables a vHBA on a specified adapter port for a specified PCI function.

- **vhba - -stats <pcifn>** -Displays statistics for the virtual HBA.
- **vhba - -statsclr <pcifn>** - Resets statistics for the virtual HBA.

For details on using these commands, refer to the *QLogic BR Series Adapter Administrator's Guide*.

Following are available vNIC commands:

- **vnic - -create <port_id>** [*-bmin <min_bandwidth>*] [*-bmax <max_bandwidth>*]- Creates a new vNIC instance for a given adapter port. You can specify the maximum bandwidth allowable for this vNIC.
- **vnic - -delete <pcifn>** - Removes the specified vNIC instance.
- **vnic - -query <pcifn>** - Queries information about the virtual NIC.
- **vnic - -enable <pcifn>** - Enables a vNIC on a specified adapter port for a specified PCI function.
- **vnic - -disable <pcifn>** - Disables a vNIC on a specified adapter port for a specified PCI function.
- **vnic - -stats <pcifn>** - Displays statistics for the virtual NIC.
- **vnic - -statsclr <pcifn>** - Resets vNIC statistics.
- **vnic - -bw <pcifn>** [*-bmin <min bandwidth>*] [*-bmax <max bandwidth>*]
- per- Modifies the maximum allowable bandwidth for a vNIC.

For details on using these commands, refer to the *QLogic BR Series Adapter Administrator's Guide*.

Virtual port persistency

Virtual port configurations for Linux and Windows systems will persist after the system reboots or after driver upgrades.

Additional general features

Following are brief descriptions of additional general features supported on all QLogic BR-Series Adapters:

- BIOS and UEFI support:
  - x86 and x64 Basic Input/Output System (BIOS)
  - Unified Extensible Firmware Interface (UEFI)
  - PCI BIOS 3.1 or later
  - SMBIOS specification version 2.4 or later
  - Fabric-based boot LUN discovery
  - Network boot (PXE, UEFI)

- ❑ gPXE support for VMware ESXi 5.x auto-deployment

NOTE

Network boot and gPXE support for VMware ESXi 5.x auto-deployment are supported only on CNA and NIC only.

- I/O Device Management (IODM)

  For VMware, events such as RSCN or link state changes are reported to the operating system for diagnoses of various storage protocol issues.

- MultiQueue support

  ESXi 5.5 driver supports performance scalability features like MultiQueue. This allows ESX to distribute incoming I/O on these queues based on CPU affinity.

  The use of multiple queues to send requests and get responses has the following advantages:

  - ❑ Reduces CPU cost per I/O.
  - ❑ Enhance the performance of storage adapter.

- Extended storage request block (SRB)

  Windows Server® 2012 uses the small computer system interface (SCSI) request block or SRB to relay information related to SCSI commands.

  Windows versions prior to Windows 2012 have the following limitations:

  - ❑ Only 16-byte command descriptor blocks (CDB) are supported.
  - ❑ There is no support for bi-directional CDBs.

  For Windows 2012 and later, support is available for the following:

  - ❑ 16-byte CDBs and greater
  - ❑ Bi-directional CDBs
  - ❑ More than 254 I/Os per LUN
  - ❑ New addressing scheme

- Human Interface Infrastructure (HII) menu support. These menus are integrated into the UEFI configuration browser. Options in these menus allow you to enable, disable, and set port speed for adapter ports. It supports IBM Agentless Inventory Manager (AIM) framework which queries some of the host bus adapter properties using a new VFR formset. The support is for the BR-1867 and BR-1869 adapters only and is limited to retrieving (get) and not for updating (set) configuration.

- Host Connectivity Manager (HCM) device management and QLogic Command Line Utility (BCU) tools for comprehensive adapter management.
- Hyper-V®. This consolidates multiple server roles as separate virtual machines (VMs) using the Windows Server 2008 R2 and later operating system and provides integrated management tools to manage both physical and virtual resources.
- Management APIs for integration with a management application, such as Brocade Network Advisor.
- PCIe interface with eight lanes. The adapter operates in Gen 1 and Gen 2 server connectors that have the following specifications per lane:
  - PCIe Gen 2 connector. Transfer rate of 5 Gigatransfers per second (GT/s) per lane. Data rate of 500 MBps per lane.
  - PCIe Gen 1 connector. Transfer rate of 2.5 GT/s per lane. Data rate of 250 MBps per lane.
- Plug-n-play and power management for all supported operating systems.
- RoHS-6. Certification by the European Union Restriction of Hazardous Substances Directive (RoHS) that adapter hardware components do not contain any of the six restricted materials. These are mercury, chromium VI, cadmium, polybrominated biphenyl ether, lead, and polybrominated biphenyl.
- Small form-factor pluggable (SFP+) transceiver optics on stand-up adapters for enhanced serviceability (stand-up adapters only).
- Storage Management Initiative Specification (SMI-S).

  Specification supporting the Common Information Model (CIM) Provider, which allows any standard Common Information Model (CIM) and SMI-S-based management software to manage installed QLogic BR-Series Adapters.

NOTE

Although SMI-S Provider and CIM Provider may be used interchangeably, CIM is the more generic term, while SMI-S is storage-specific.

- Switch fabric topology - CNAs and Fabric Adapter ports configured in CNA mode can connect to a switch that supports Data Center Bridging (DCB) through 10 GbE ports.
- Synthetic Fibre Channel Ports

For Windows 2012 Server, guest operating systems (virtual machines) running on Hyper-V can detect and manage Fibre Channel ports. The host bus adapters or Fabric adapter ports configured in HBA mode that are presented to the virtual machines (VMs) are called “synthetic” FC ports. This feature is configured through Hyper-V.

- UCM compliance

  QLogic BR-Series Adapters are compliant with IBM Unified Configuration Manager (UCM).

- Windows Management Instrumentation (WMI).
- Windows Preinstallation Environment (WinPE), a minimal operating system with limited services for Windows Server or Windows Vista® used for unattended deployment of workstations and servers. WinPE is designed for use as a standalone preinstallation environment and as a component of other setup and recovery technologies. WinPE is supported by QLogic Windows Server 2008 R2 network and storage drivers.
- Windows Server 2008 R2 and later, Red Hat Enterprise Linux (RHEL)®, SUSE Linux Enterprise Server (SLES)®, VMware® ESX Server®, Solaris, and Oracle Linux (OL). For more details, refer to “Host operating system support” on page 70.
- Windows Server Core, a minimal server option for Windows Server 2008 R2 operating systems that provides a low-maintenance server environment with limited functionality. All configuration and maintenance is done through command line interface windows or by connecting to a system remotely through a management application.
- Windows 7. Windows 7 x86 is supported by Windows Server 2008 R2 x86 drivers. Windows 7 x64 is supported by Windows Server 2008 R2 x64 drivers.
- Windows Server 2012.

FCoE features

CNAs and Fabric Adapter ports configured in CNA mode support the following Fibre Channel over Ethernet (FCoE) features. For limitations and considerations for feature support for specific operating systems, refer to “Operating system considerations and limitations” on page 61.

- 500,000 IOPS per port for maximum I/O transfer rates.
- 10 Gbps throughput per port full duplex.
- Boot over SAN.

This feature provides the ability to boot the host operating system from a boot device located somewhere on the SAN instead of the host's local disk or directly attached Fibre Channel storage. Specifically, this "boot device" is a logical unit number (LUN) located on a storage device.

- Fabric-based boot LUN discovery is a feature that allows the host to obtain boot LUN information from the fabric zone database.

NOTE

Fabric-based boot LUN discovery is not available for direct-attached targets.

- Fibre Channel-Security Protocol (FC-SP) provides device authentication through key management.
- FCoE Initialization Protocol (FIP) support for the following:
  - FIP 2.0
  - preFIP and FIP 1.03
  - FIP Discovery protocol for dynamic FCF discovery and FCoE link management
  - FPMA type FIP fabric login
  - VLAN discovery for untagged and priority tagged FIP frames
  - FIP discovery solicitation and FCP discovery
  - Login (FIP and FCoE)
  - FIP link down handling.
  - FIP version compatibility
  - FIP keep alive
  - FIP clear virtual links

NOTE

The CNA FIP logic automatically adapts to the adequate FIP version and preFIP to enable backward compatibility.

- Interrupt coalescing

This feature provides a method to delay generation of host interrupts and thereby combine (coalesce) processing of multiple events. This reduces the interrupt processing rate and reduces the time that the CPU spends on context switching. You can configure the following parameters per port to adjust interrupt coalescing:

- ❑ Interrupt time delay. There is a time delay during which the host generates interrupts. You can increase this delay time and thereby coalesce multiple interrupts events into one. This results in fewer interrupts for interrupt events.
- ❑ Interrupt latency timer. An interrupt is generated when no new reply message requests occur after a specific time period. You can adjust this time period and thereby minimize I/O latency.

- I/O execution throttle

  Refer to “I/O execution throttle” under “Host bus adapter features” on page 49.

- LUN masking.

  LUN masking establishes access control to shared storage to isolate traffic between different initiators that are zoned in with the same storage target. LUN masking is similar to zoning, where a device in a specific zone can communicate only with other devices connected to the fabric within the same zone. With LUN masking, an initiator port is allowed to access only those LUNs identified for a specific target.

  Enable LUN masking on an adapter physical port through the HCM **Basic Port Configuration** dialog box and the BCU **fcpim –lunmaskadd** command to identify the logical port (initiator) and remote WWN (target) for the LUN number. Refer to the *QLogic BR Series Adapter Administrator’s Guide* for more information on configuration.

  You can also enable LUN masking through the QLogic BIOS Configuration Utility and your system’s UEFI setup screens. Refer to “Configuring BIOS with the BIOS Configuration Utility” on page 246 and “Configuring UEFI” on page 255.

  This feature has the following limitations:

  - ❑ Only 16 LUN masking entries are allowed per physical port.
  - ❑ Multiple BCU instances for adding and deleting LUN masking are not supported.
  - ❑ This feature is only supported on QLogic host bus adapters and Fabric Adapters.

You can configure LUN masking for a particular target even without the actual devices being present in the network.

When configuring boot over SAN, mask the boot LUN so that the initiator has exclusive access to the boot LUN. Refer to the *QLogic BR Series Adapter Administrator's Guide* for more information.

- N_Port ID Virtualization (NPIV). This allows multiple N_Ports to share a single physical N_Port. This allows multiple Fibre Channel initiators to occupy a single physical port and reduce SAN hardware requirements.
- Persistent binding enables you to permanently assign a system SCSI target ID to a specific Fibre Channel device. This is applicable for Windows operating systems only.
- Simple Network Management Protocol (SNMP)

  SNMP is an industry-standard method of monitoring and managing network devices. QLogic CNA adapters and Fabric Adapter ports configured in CNA mode provide agent and MIB support for SNMP. For more information, refer to "Simple Network Management Protocol" on page 67.
- SRB support

  Refer to "SRB support" under "Additional general features" on page 31.
- Target rate limiting. You can enable or disable this feature on specific ports. Target rate limiting relies on the storage driver to determine the speed capability of discovered remote ports, and then uses this information to throttle the FCP traffic rate to slow-draining targets. This reduces or eliminates network congestion and alleviates I/O slowdowns at faster targets.

  Target rate limiting is enforced on all targets that are operating at a speed lower than that of the target with the highest speed. If the driver is unable to determine a remote port's speed, 1 Gbps is assumed. You can change default speed using BCU commands. Target rate limiting protects only FCP write traffic.
- vHBA

  Virtual HBAs (vHBAs) are virtual port partitions that appear as virtual or logical HBAs to the host operating system. Multiple vHBAs are not supported, so you cannot create or delete them from an adapter. For more information, refer to"I/O virtualization" on page 28.

Data Center Bridging and Ethernet features

QLogic CNAs and Fabric Adapter ports configured in CNA or NIC mode support the following Data Center Bridging (DCB) and Ethernet networking features. For limitations and considerations for feature support for specific operating systems, refer to “Operating system considerations and limitations” on page 61.

- 10 Gbps throughput per port full duplex.
- 1500 or 9600 byte (jumbo) frames

  These frames allow data to be transferred with less effort, reduce CPU utilization, and increase throughput. Mini-jumbo frames (2500 bytes) are required to encapsulate FCoE frames on DCB. Network administrators can change the jumbo packet size from the default setting using host operating system commands as described in A, “Adapter Configuration”. Note that the MTU size refers to the MTU for network configuration only. Internally, hardware will always be configured to support FCoE frames that require mini-jumbo size frames.

  NOTE

  The jumbo frame size set for the network driver cannot be greater than the setting on the attached switch that supports Data Center Bridging (DCB) or the switch cannot accept jumbo frames.

- Brocade Network Intermediate Driver (BNI)

  This provides support for multiple VLANs on ports and teams on 2008 R2 systems. This driver is installed with the adapter software.

  NOTE

  For Windows Server 2012, the BNI driver is not installed because VLANs are natively supported by the Windows 2012 operating system.

- Checksum/CRC offloads for FCoE packets, IPv4/IPv6 TCP and UDP packets, and IPv4 header.

  The checksum offload supports Checksum offloads for TCP and UDP packets and the IPv4 header. This enables the CNA to compute the checksum, which saves host CPU cycles. The CPU utilization savings for TCP checksum offload can range from a few percent with an MTU of 1500, and up to 10-15 percent for an MTU of 9000. The greatest savings are provided for larger packets.

- Configurable Max NetQueue

  By reducing the number of NetQueues, MSI vectors are reduced for installed adapter ports. With many adapters, a high number of MSI-X vectors on ESX platforms can cause poor performance and cause adapters to run in INTx mode. Using new bnad (QLogic network adapter driver) parameters, the driver can set NetQueue limits and allocate MSI-X vectors according to these limits. For Max NetQueue configuration values, refer table “Network driver module parameters” on page 344.

- Data Center Bridging Capability Exchange Protocol (DCBCXP) (IEEE 802.1 standard)

  DCBCXP is used between the CNA or Fabric Adapter port configured in CNA mode and the switch that supports Data Center Bridging (DCB) to exchange configuration with directly connected peers. DCBCXP uses LLDP to exchange parameters between two link peers.

- Enhanced transmission selection (IEEE 802.1Qaz standard)

  ETS provides guidelines for creating priority groups to enable guaranteed bandwidth per group. More important storage data traffic can be assigned higher priority and guaranteed bandwidth so it is not stalled by less-important traffic.

- Ethernet flow control

  Ethernet flow control is a mechanism for managing data transmission between two network nodes to prevent a fast sender from overrunning a slow receiver. When an overwhelmed receiver generates a PAUSE frame, this halts transmission for a specified period of time. Traffic resumes when time specified in the frame expires or PAUSE zero is received.

- Flexible MAC address

  Flexible MAC address based classification of inbound packets for virtualization functions. This provides security for these functions by isolating virtual machines from each other and controlling the resources they access.

- gPXE

  This is an open source feature that allows systems without network PXE support to boot over the network. It enhances existing PXE environments using Trivial File Transfer Protocol (TFTP) with additional protocols such as Domain Name System (DNS), Hypertext Transfer Protocol (HTTP), and Internet Small Computer System Interface (iSCSI). VLAN tagging is also enabled. For more information, refer to “gPXE boot” on page 202.

- Hypervisor

  Hypervisor (Hyper-V) is a processor-specific virtualization platform that allows multiple operating systems to share a single server platform. Refer to “Host operating system support” on page 70 for a list of operating systems that support hypervisor operation for QLogic BR-Series Adapters.

- IBM Virtual Fabric support

  IBM Virtual Fabric, or vNIC, is supported on QLogic CNAs and Fabric Adapter ports configured in CNA or NIC mode. IBM Virtual Fabric is a switch agnostic NIC partitioning feature that enforces a minimum guaranteed bandwidth for vNICs. Using BCU commands, you can specify both minimum and maximum bandwidths for vNICs that guarantees that the bandwidth is available from a port for the vNICs. Note that the sum of bandwidths assigned to vNICs cannot exceed the link speed. For more information on configuring bandwidths for Virtual Fabric support, refer to the *QLogic BR Series Adapter Administrator’s Guide*.

- Interrupt coalescing

  Interrupt coalescing keeps the host system from flooding with too many interrupts. This allows the system to reduce the number of interrupts generated by generating a single interrupt for multiple packets. Increasing the “coalescing timer” should lower the interrupt count and lessen CPU utilization.

- Interrupt moderation

  Interrupt moderation implements dynamic selection interrupt coalescing values based on traffic and system load profiles. Traffic is continuously monitored to place in categories between “high throughput sensitive” and “high latency sensitive.” Similarly, the host system is monitored regularly to place it in categories between “highly loaded” and “minimally loaded.” The driver dynamically selects interrupt coalescing values based on this profiling.

- Internet Small Computer System Interface (iSCSI) over DCB.

  This feature leverages pre-priority-based flow control (PFC) and enhanced transmission selection (ETS) features provided by Data Center Bridging (DCB) to Ethernet to enable more lossless delivery of iSCSI traffic in data center environments. This feature enables fabric-wide configuration of the iSCSI traffic. This is achieved by configuring the iSCSI traffic parameters on the switches, which distribute those parameters to directly-attached, DCB-capable iSCSI servers and targets. The adapter firmware obtains the iSCSI configuration from the switch through the DCB Exchange Protocol (DCBX) and applies the configuration to the network driver to classify the iSCSI traffic. The adapter will use this as a priority for all network traffic.

Note the following for the different adapter models:

- ❑ On CNA adapters and the Fabric Adapter port configured in CNA mode, ETS will only be supported either between network and FCoE priority or one network and iSCSI priority.
- ❑ On Fabric Adapters, a separate transmit queue will be available for iSCSI traffic. This will allow iSCSI traffic to be sent on a separate queue and priority and not compete with network traffic.

This feature is not supported on Solaris systems.

- Linux BNA MCVLAN

  MACVLAN provides multiple logical Ethernet network interface cards to be attached to the same LAN segment. This allows the user to create virtual interfaces that map packets to or from specific MAC addresses to the base BNA network interface. The kernel supports this using module called macvlan.

  BNA driver, as part of the set_rx_mode entry point, is modified to traverse the list of new unicast MAC addresses to be added to the UCAM filter in ASIC. This allows the driver to receive packets with these addresses as destination MAC addresses. The new MACVLAN virtual interface is created using the ip command. This interface can be used like any other interface on the system to configure IP and run network traffic.

- Link aggregation (NIC teaming)

  A network interface “team” is a collection of physical Ethernet interfaces (CNA ports and the Fabric Adapter port configured in CNA or NIC mode) acting as a single interface. Teaming overcomes problems with bandwidth limitation and redundancy often associated with Ethernet connections. Combining (aggregating) ports can increase the link speed beyond the limits of one port and provide redundancy.

NOTE

For Windows Server 2012, the BNI driver is not installed because teaming and VLAN are natively supported by the Windows 2012 operating system.

For Windows systems, you can team up to eight ports across multiple CNAs (and Fabric Adapter ports configured in CNA or NIC mode) in three modes: failover, failback, or 802.3ad using BCU commands and HCM dialog boxes. To determine the maximum ports that you can team with other systems, refer to your operating system documentation. Note that HCM only supports teaming configuration for Windows systems.

- Failover mode provides fault tolerance. Only one port in a team is active at a time (primary port), and the others are in standby mode. If the primary port goes down, a secondary port is chosen using a round-robin algorithm as the next primary. This port continues to be primary, even if the original primary port returns.
- Failback mode is an extension of the Failover mode. In addition to the events that occur during a normal failover, if the original primary port comes back up, that port again becomes the primary port.
- 802.3ad is an IEEE specification that includes Link Aggregation Control Protocol (LACP) as a method to control how several physical ports bundle to form a single logical channel. LACP allows a network device to negotiate automatic bundling of links by sending LACP packets to the peer (a device directly connected to a device that also implements LACP). This mode provides larger bandwidth in fault tolerance.

Consider the following when configuring teaming:

- Converged FCoE and network traffic is not supported on ports that participate in an IEEE 802.3ad-based team.
- If you are using Windows Hypervisor to create VMs and configuring teaming, you should create VLANs using Hyper-V Manager instead of using BCU commands or HCM. If VLANs were created using BCU commands or HCM before using Hypervisor, you should delete those VLANs.
- For Windows Server 2012, the BNI driver is not installed because teaming is natively supported by the Windows 2012 operating system. Although teaming is supported on Linux, Solaris, and VMware, it is implemented by the specific operating system vendor.
- Configuration is also required on the switch for NIC teaming to function. Refer to the *Brocade Fabric OS Administrator's Guide* for details.

- MAC and VLAN filtering and tagging

  A mechanism that allows multiple networks to transparently share the same physical network link without leakage of information between networks. Adapter hardware filters data frames from devices on a LAN so that only frames that match the MAC and VLAN for the configured LAN are forwarded to that LAN.

- Multiple transmit (Tx) priority queues.

  Support for multiple transmit priority queues in the network driver allows the driver to establish multiple transmit queues and specific priorities in the ASIC. This feature enables QLogic CNAs and Fabric Adapter ports configured in CNA mode to pass-link layer traffic using multiple transmit priorities without interfering with the assigned priority for the FCoE or iSCSI traffic on the same port. This also allows handling of FCoE or iSCSI priority changes propagated from the DCB switch. Multiple traffic priorities are used to ensure that Quality of Service (QoS) is guaranteed across different traffic classes. The driver supports one transmit queue on CNAs and eight on Fabric Adapters. If multiple vNICs are configured on a Fabric Adapter, each vNIC instance has its own set of eight Tx queues. To configure multiple queues for sending priority tagged packets, refer to “Network driver parameters” on page 332.

  Transmit NetQueues with multiple priorities allow VMware (v4.1 or later) to assign different priorities to transmit NetQueues to ensure QoS for different classes of traffic on an ESX host. Multiple transmit priorities are supported in the following ways on QLogic BR-Series Adapters:

  - On CNAs and Fabric Adapter ports configured in NIC mode, all eight priorities can be assigned to transmit NetQueues by VMware.
  - On CNAs only, every request to assign a priority different from the default network priority will be denied. If a storage priority is reserved, one non-default priority could be assigned to a transmit NetQueue.
  - On Fabric Adapter ports configured in CNA mode, only allowed priorities can be assigned to transmit NetQueues by VMware. Requests for a priority are denied if the priority matches a reserved storage priority.

- MSI-X

  This is an extended version of Message Signaled Interrupts (MSI), defined in the PCI 3.0 specification. MSI-X helps improve overall system performance by contributing to lower interrupt latency and improved utilization of the host CPU. MSI-X is supported by Linux RHEL5, RHEL 6, SLES 10 and 11, Windows Server 2008 R2 and later, ESX 5.0 and ESX 5.5.

- Network Boot (PXE and UNDI)

  The preboot execution environment (PXE) mechanism, embedded in the adapter firmware, provides the ability to boot the host operating system from a system located on the LAN instead of over the SAN or from the host's local disk. Universal network device interface (UNDI) is an application program interface (API) used by the PXE protocol to enable basic control of I/O and performs other administrative chores such as setting up the MAC address and retrieving statistics through the adapter. UNDI drivers are embedded in the adapter firmware.

- Network Priority

  The CNA and Fabric Adapter port configured in CNA mode support this feature, which provides a mechanism to enable DCB flow control (IEEE 802.1Qbb Priority-based Flow Control standard: and Pause 802.1p standard) on network traffic. In addition, it guarantees mutual exclusion of FCoE and network priorities to ensure proper enhanced transmission selection (ETS). This feature is not supported on host bus adapters or Fabric Adapter ports configured in HBA mode.

  This feature does not need to be enabled on the CNA port, the Fabric Adapter port configured in CNA mode, or the switch. Specific DCB attributes, including priorities for FCoE traffic, are configured on the switch that supports Data Center Bridging (DCB). These attributes propagate to the CNA DCB port through the DCBCXP. Adapter firmware processes this information and derives priorities for network traffic. The network driver is notified of the network priority and tags both FCoE and network frames with their priorities.

- NDIS QoS

  This feature is only supported on the QLogic Fabric Adapters operating with Windows Server 2012. Network Data Interface Specification (NDIS) QoS provides the following benefits:

  - Enables collaboration between QoS defined by the end user and network configured Data Center Bridging (DCB).
  - Enables transmit egress traffic priority over DCB networks.
  - Allows prepriority-based flow control (PFC) and enhanced transmission selection (ETS).

Disable and enable this feature through the QLogic 10G Ethernet Adapter Advanced Property sheet. Refer to “Network driver parameters” on page 332. Once enabled, you can use DCB PowerShell to perform the following tasks:

- ❑ Create a new traffic class for iSCSI traffic.
- ❑ Create a policy to associate traffic to the traffic class.
- ❑ Query the operational QoS settings on the adapter.
- ❑ Query the configured traffic classes.
- ❑ Enable or disable PFC.

Refer to your Windows PowerShell Guide for more information.

- Priority-based flow control (IEEE 802.1Qbb standard)

  This feature defines eight priority levels to allow eight independent lossless virtual lanes. Priority-based flow control pauses traffic based on the priority levels and restarts traffic through a high-level pause algorithm.

- Precision Time Protocol (PTP)

  All QLogic standup and mezzanine adapter ports with NIC personality provides support for software PTP implementation.

  PTP is an IEEE protocol (1588) used to synchronize the clocks in the computer network. The precision granularity is in the order of nanoseconds. A master is selected as part of PTP initialization to which all the nodes synchronizes their clocks. The master periodically broadcasts the time-updates. Clients use this information along with the delay calculated using the PTP exchanges and adjusts their clocks. There are two variants of PTP implementations:

  - ❑ Hardware

    Need hardware support (phy module) for the NIC. Hardware does the actual time stamping for the PTP packets

  - ❑ Software

    NIC driver need to timestamp the tx PTP packets.

NOTE

The Linux BNA driver currently supports only the software PTP implementation.

- UEFI Health Check Protocol

  Driver Health Protocol produces a collection of services that allow the UEFI driver to report health status to the platform. This protocol provides warning or error messages to the user, performs length repair operations and requests that the user to make hardware or software configuration changes.

  This protocol is required only for devices potentially in a bad state and recoverable either through a repair operation or a configuration change. The UEFI Boot Manager uses the services of the Driver Health Protocol to determine the health status of a device and display that status information on a UEFI console. The UEFI Boot Manager may also choose to perform actions to transition devices from a bad state to a usable state.

  NOTE

  All QLogic BR-Series adapters support Driver Health Protocol. This feature works only with UEFI 2.2 or higher system BIOS versions.

- Receive side scaling (RSS) feature for advanced link layer

  This feature enables receive processing to be balanced across multiple processors while maintaining in-order delivery of data, parallel execution, and dynamic load balancing.

- Simple Network Management Protocol (SNMP)

  SNMP is an industry-standard method of monitoring and managing network devices. QLogic CNAs and Fabric Adapter ports configured in CNA or NIC mode provide agent and MIB support for SNMP. For more information, refer to “Simple Network Management Protocol” on page 67.

- TCP segmentation offload (TSO) and large send offload (LSO)

  Large chunks of data must be segmented to smaller segments to pass through network elements. LSO increases outbound throughput by reducing CPU overhead. Offloading to the network card, where segmentation can be done by the Transmission Control Protocol (TCP), is called TCP segmentation. Also see Windows Hyper-V VMQ look ahead data split.

- Team Virtual Machine Queue (VMQ) support

  For Windows Server 2012, the BNI driver is not installed because teaming is natively supported by the Windows 2012 operating system.

VMQ support allows classification of packets that the adapter receives using the destination MAC address, and then routing the packets to different receive queues. Packets can be directly transferred to a virtual machine's shared memory using direct memory access (DMA). This allows scaling to multiple processors by processing packets for different virtual machines in on different processors. VMQ support provides the following features:

- ❑ Improves network throughput by distributing processing of network traffic for multiple virtual machines (VMs) among multiple processors.
- ❑ Reduces CPU utilization by offloading receive packet filtering to NIC hardware.
- ❑ Avoids network data copy by using DMA to transfer data directly to VM memory.
- ❑ Splits network data to provide a secure environment.
- ❑ Supports live migration

- VLAN (IEEE 802.1Q standard)

  A Virtual LAN (VLAN) is a way to provide segmentation of an Ethernet network. A VLAN is a group of hosts with a common set of requirements that communicate as if they were attached to the same LAN segment, regardless of their physical location. A VLAN has the same attributes as a physical LAN, but it allows end stations to be logically grouped together.

  For Windows Server 2012, the BNI driver is not installed because VLANs are natively supported by the Windows 2012 operating system. VLANs are supported on Linux, Solaris, and VMware, but are implemented by the specific operating system vendor.

- VLANs on teams. Specific VLANs can be configured to communicate over specific teams using BCU commands and HCM. The function of the VLAN over a team is the same as a VLAN on a single port. A team can support up to 64 VLANs, and the VLANs should have the same MAC address as the team. Changing a team's MAC address changes the address of VLANs over the team. Changing the team name adds the name to the prefix of the VLAN's display name.

  For Windows Server 2012, the BNI driver is not installed because teaming and VLANs are natively supported by the Windows 2012. VLANs on teams are supported on Linux, Solaris, and VMware, but are implemented by the specific operating system vendor. For more details on teaming, refer to "Link aggregation (NIC teaming)" in this section. For more information on VLANs, refer to "VLAN (IEEE 802.1Q standard)" in this section.

- VLAN and Teaming Configuration Persistence

  VLAN and teaming configurations can be maintained when updating drivers. Configurations are automatically saved during upgrade and can be restored using BCU commands or HCM.

- VMware NetQueue

  This feature improves performance in 10 GbE virtualized environments by providing multiple receive and transmit queues, which allows processing to be scaled to multiple CPUs. The QLogic BR-Series Adapter network driver (CNAs only) supports receive (Rx), as well as transmit (Tx) NetQueues. This feature requires MSI-X support on host systems.

- VMware Network IO Control or NetIOC, also known as NetIORM (Network IO Resource Management), is a QoS mechanism that allows different traffic types to coexist on a single physical NIC in a predictable manner. A primary benefit of NetIOC is that it ensures that adaptive transmit coalescing settings are not lost during data path or device reset.

- VMware VMdirect Path I/O

  This allows guest operating systems to directly access an I/O device, bypassing the virtualization layer. This can improve performance for ESX systems that use high-speed I/O devices, such as 10 Gbps Ethernet.

- vNICs

  Virtual Network Interface Cards (vNICs) are virtual partitions that appear as virtual or logical NICs to the host operating system. vNICs are supported on QLogic CNAs and on Fabric Adapter 10 GbE ports configured in CNA or NIC mode. Multiple vNICs are only supported on Fabric Adapter ports.

  Using BCU commands, you can create up to four vNICs per Fabric Adapter port configured in CNA or NIC mode. You can configure features, such as vNIC teaming, for individual vNICs. For a two-port Fabric Adapter, 16 total vNICs are possible. For more information, refer to “I/O virtualization” on page 28.

- Windows Hyper-V VMQ look ahead data split

  Windows Hyper-V virtual machine queue (VMQ) look ahead split is a security feature for using virtual machine shared memory for a virtual machine queue, where the adapter splits the data packet so that look ahead data and post- look ahead data are transmitted to the shared memory allocated for this data. In addition to VM data separation from HyperV it also enables better performance due to less data movement.

Host bus adapter features

QLogic Fibre Channel host bus adapters and Fabric Adapter ports configured in HBA mode provide the following features for enhanced performance and connectivity in the SAN. For limitations and considerations for feature support for specific operating systems, refer to “Operating system considerations and limitations” on page 61.

- 500,000 IOPS per port for maximum IO transfer rates.
- 1,600 Mbps throughput per port full duplex.
- 16 Virtual Channels (VCs) per port. VC-RDY flow control can use these multiple channels for Quality of Service (QoS) and traffic prioritization in physical and virtualized network environments.
- BB Credit Recovery. Buffer-to-buffer credit primitives (R_RDY and VC_RDY) exchanged at the link level can get corrupted and become unrecognizable at the receivers. This will lead to depletion of BB Credits that were exchanged between the adapter and switch ports during fabric login (FLOGI). Similarly, if the start of frame gets corrupted, the receiving port will not send the corresponding R_RDY to the port at the other end of the link and will result in loss of credit for that port. This will cause the ports to operate with few buffer credits and impact throughput until a link reset or link offline event. To avoid this problem, the credit loss recovery feature enables ports to recover the lost credits.

  Following are feature limitations:

  - The feature is only supported on Brocade switches running Fabric OS 7.1 and later.
  - The feature only works at the maximum supported speed of the port (8 Gbps or 16 Gbps, depending on the adapter model.
  - The feature only works in R_RDY mode and not in VC_RDY mode, therefore it is enabled with FA-PWWN and forward error correction (FEC), but not supported when N_Port trunking or QoS are enabled. Note that FEC is supported on 16 Gbps ports only.
  - The feature is not supported when a port is in D_Port mode.
  - Lost credits are recovered during a link reset.

BCU commands and HCM options are available to enable and disable the feature. When enabling BB Credit Recovery, you provide a buffer-to-buffer state change number (BB_SCN), which specifies the number of frames to send and R_RDYs to return from the receiver before the receiver will detect lost credits and initiate credit recovery. BCU commands are also available to query for such information as credit recovery state (offline or online) and offline reasons. In addition, commands are available to display port statistics for BB_Credit recovery, credit recovery frames lost, R_RDYs lost, and link resets. Refer to the *QLogic BR Series Adapter Administrator's Guide* for details.

- ❑ HCM - **Basic Port Configuration** dialog box.
- ❑ BCU - **port - -bbcr_enable**, **port - -bbcr_disable**, **port - -stats**, and **port - -bbcr_query**.

- ■ Boot over SAN. This feature provides the ability to boot the host operating system from a boot device located somewhere on the SAN instead of the host's local disk or direct-attached Fibre Channel storage. Specifically, this "boot device" is a logical unit number (LUN) located on a storage device. For booting over SAN from direct-attached storage, both Fibre Channel Arbitrated Loop (FC-AL) and point-to-point (P2P) topologies are supported.
- ■ Diagnostic port (D_Port)

  When a switch or adapter port is enabled as a Diagnostic (D_Port), electrical loopback, optical loopback, and link traffic diagnostic tests initiate on the link between the adapter and the connected switch port. Results can be viewed from the switch using Fabric OS commands. Results can be viewed from the adapter using BCU commands and HCM. Once an adapter port is enabled as a D_Port, the port does not participate in fabric operations, log in to a remote device, or run data traffic. D_Port testing is supported only on BR-1860 Fabric Adapter ports operating in HBA mode with a 16 Gbps SFP and on Brocade 16 Gbps switches running Fabric OS v7.1.0 or later.

  A D_Port can be initiated in one of two modes:

  - ❑ Dynamic mode - If the D_Port is enabled on the switch only, it enables the connected adapter port as a D_Port. The switch initiates and stops tests on the adapter port as specified by switch configuration. You cannot restart the test or specify a test parameter through BCU commands or HCM. For dynamic mode, D_Port configuration is not required on the adapter. Also, if D_Port is enabled on host bus adapter port, this will automatically enable connected switch port as D_Port.

In dynamic mode, you can disable the adapter physical port using the **bcu port - -disable** command. This will disable the port as a D_Port. When the adapter port is enabled again, the switch will again enable the adapter port as a D_Port if the switch port is still enabled as a D_Port. However, you must restart tests from the switch side.

- Static mode - This mode is initiated after disabling the adapter port using **bcu port - -disable**, enabling D_Port on the switch port using appropriate Fabric OS commands, then configuring the adapter port as a D_Port through BCU commands or HCM. In static mode, you can control and configure tests, establish a test pattern and transmit frame count for loopback tests, display results, and restart testing from the adapter using BCU commands. You can use HCM to enable D_Port testing, set the test pattern, and transmit frame count. This mode cannot be initiated if the adapter is in dynamic mode.

The following are BCU commands can be used for D_Port configuration and control:

- **bcu diag - -dportenable** - Enables a D_Port on a specific port, sets the test pattern, and sets the frame count for testing.
- **bcu diag - -dportdisable** - Disables a D_Port on a specific port and sets the port back to an N_Port or NL_Port.
- **bcu diag - -dportshow** - Displays test results for a test in progress on a specific D_Port.
- **bcu diag - -dportstart** - Restarts a test on a specific D_Port when the test has completed.
- **bcu port - -list** - Displays the D_Port enabled or disabled state on the adapter and connected switch.

Consider the following limitations and considerations for D_Port configurations on QLogic BR-Series Adapters:

- The D_Port is supported only on BR-1860 Fabric Adapter ports operating in HBA mode with a 16 Gbps SFP and on Brocade 16 Gbps switches running Fabric OS version 7.1.0 or later. The F_Port of the connected must be D_Port-capable. The adapter must be using driver version 3.2.0 or later.
- There is a limit on the number of switch ports on which you can run simultaneous D_Port tests that applies to both static and dynamic D_Port modes. This limit is four ports when the switch is running Fabric OS v7.1.x and v7.2.x and the Adapter is running v3.2.0 or later.

- Trunking cannot be enabled on ports operating in D_Port mode so that ports can be tested independently of a trunk.
- D_Ports do not support the loop topology.
- The adapter D_Port is supported only on connections between the switch and adapter.
- D_Ports on the adapter do not support Forward Error Correction (FEC) and CR (Credit Recovery). If these features are enabled on the switch side, the adapter ignores them.
- The D_Port is not supported on adapter ports configured in CNA mode.
- The D_Port test result (optic loopback, electrical loopback, or link traffic test) will be updated only after all the tests has been completed, but the start time will be updated upon test start.
- Disabling and enabling the port on either side of the link will not restart the test.
- Due to SFP EWRAP bleed-through, during the beginning of the switch electrical loopback test, the adapter will receive some broken frames, which may cause the port statistic error counter to increase. Some examples are CRC err, bad EOF, and invalid order set. Similar results occur for the optical loopback test. You should ignore these port statistics on the host bus adapter.
- The following commands from the switch are not supported by the adapter port, and the adapter port will reject them:
  - portdporttest --stop
  - portdporttest --restart

  The adapter does support **portdporttest --start**, however options for this command are ignored.
- The link between the switch and adapter D_Port has to be marginally functional and be capable of supporting minimal traffic to enable the switch and adapter D_Port.
- A D_Port is useful to diagnose marginal faults only. A complete failure of any component cannot be detected.
- D_Port configuration is not supported on mezzanine cards.

For additional details on the D_Port feature, especially switch and adapter configuration procedures, refer to the *Brocade Fabric OS Troubleshooting and Diagnostics Guide*. For details on adapter configuration, commands, and feature limitations and considerations, refer to the *QLogic BR Series Adapter Administrator's Guide*.

- End-to-end link beaconing between an adapter port and a switch port to which it connects. (Requires Brocade Fabric OS 6.3x or later.)
- Enhanced Hibernation support

  Before Windows Server 2012, the driver used proprietary logic to pass on special LUN details through the adapter flash memory. With Windows Server 2012, the driver can reliably identify the LUN used for booting the operating system and storing the paging file. The paging file can also reside on a non-boot LUN spanning different adapter ports.
- Fabric Assigned Port World Wide Name (FA-PWWN)

  This is a feature of Dynamic Fabric Provisioning (DFP) that is supported on QLogic host bus adapters and Fabric Adapter ports configured in HBA mode. FA-PWWN allows the adapter port to acquire its port world wide name (PWWN) from the switch port when it logs into the fabric. An FA-PWWN is a "virtual" port WWN that can be used instead of the physical PWWN to create zoning and LUN mapping and masking.

  This feature offers the following benefits:

  - You can pre-create zones with the Virtual PWWN before servers are connected to the fabric. For boot LUN creation, you can create a zone with a virtual PWWN for a storage system port that is bound to a switch port. With FA-WWN enabled on the adapter port, it will acquire the PWWN from the switch when it logs into the fabric.
  - You can use the FA-PWWN to represent a server in boot LUN zone configurations so that any physical server that is mapped to this FA-PWWN can boot from that LUN, thus simplifying boot over SAN configuration.
  - You can pre-define access control lists (ACLs) in the targets (of the boot LUNs) so that switch ports can be configured for booting Solaris, Linux, or other systems.
- BR-804 mezzanine cards connecting to a Brocade Fibre Channel switch through a Brocade 5480 switch or pass through module must meet the following requirements to support FA-PWWN:

  - The Brocade 5480 switch, functioning in Access Gateway mode, must be running Fabric OS 7.0 or later.

- ❑ The end switch must be running Fabric OS 7.0 or later and support the FA-PWWN feature.
- ❑ The FA-PWWN feature must be enabled on the Brocade 5480 switch and the end switch using the Fabric OS **fapwwn - -enable -ag** *[AG_WWN]* **-port** *port* command.

FA-PWWN is only supported on switches running Fabric OS 7.0 and later. For detailed configuration procedures and additional information on supported products and configurations: For Brocade switches, refer to the *Brocade Fabric OS Administrator's Guide*.

- Fabric-based boot LUN discovery, a feature that allows the host to obtain boot LUN information from the fabric zone database.

NOTE

This feature is not available for direct-attached targets.

- FCP-IM I/O Profiling and LUN-level Statistics

  This feature, available through HCM or BCU commands, can be configured at both initiator-target and initiator-target-LUN levels. When enabled, the driver firmware separates I/O latency statistics for the configured flows into five separate categories based on I/O size. The latency information, along with a number of other I/O related statistics, can then be queried."

  Use this feature to analyze traffic patterns and help tune host bus adapters, Fabric Adapter ports configured in HBA mode, fabrics, and targets for better performance. Note that enabling this feature impacts I/O performance. It is disabled by default and does not persist across driver reloads and system reboots.

- Fibre Channel Arbitrated Loop (FC-AL) support.

  FC-AL allows Fibre Channel devices to be connected in a loop topology and establish communication without switches. Devices connect to the loop through L_Ports. Ports that can communicate on the loop are Fabric Loop ports (FL_Port) or node loop ports (NL_Port). An arbitrated loop with an FL_Port, called a public loop, allows fabric connectivity for multiple NL_Ports. A loop topology with only NL_Ports is a private loop. Devices in a public loop can remain private by not logging into the fabric.

  FC-AL is a blocking topology and a circuit must be established before two L_Ports can communicate. The loop supports only one point-to-point circuit at a time, so when two L_Ports communicate, all other L_Ports are either monitoring or arbitrating for access to the loop.

You can configure the adapter connection for loop or point-to-point (P2P) topology through BCU commands and HCM. The “auto” option is not supported. For configuration details, refer to the *QLogic BR Series Adapter Administrator’s Guide*.

Following are aspects of FC-AL support:

- ❑ Supported on all standup host bus adapters and Fabric Adapter ports configured in HBA mode.
- ❑ Supported at port speeds of 2, 4, or 8 Gbps. Although there is no support at 16 Gbps, FC-AL will function in autonegotiation mode at other speeds.
- ❑ Supported on Windows, Linux, and VMware systems only.
- ❑ BIOS and UEFI boot supported from all FC-AL targets.

Following are limitations of FC-AL support:

- ❑ You cannot set FC-AL or loop configuration if QoS, rate limiting, virtual port, or trunking features are enabled.
- ❑ More than one vHBA (default) is not allowed.
- ❑ Hubs are not supported.
- ❑ Multiple initiators are not supported (only supported for direct-attach to a single array).
- ❑ Public loop is not supported. If a device attaches to a loop with an FL_Port, it continues to function as a private NL_Port in the loop.
- ❑ Auto topology detection is not supported. You must configure the loop topology manually when attaching to a loop. The default configured topology is P2P.

■ Fibre Channel Security Protocol (FC-SP) providing device authentication through key management. This feature is not available for Solaris platforms.

Using BCU commands and HCM, you can configure the following parameters:

- ❑ Enable authentication.
- ❑ Enter the Challenge Handshake Authentication Protocol (CHAP) secret.
- ❑ Specify the authentication algorithm.

- Forward Error Correction (FEC) provides a method to recover from errors caused on links during data transmission.

  FEC works by sending redundant data on a specified port or range of ports to ensure error-free transmission. FEC enables automatically when negotiation with a switch detects FEC capability. Although you cannot enable or disable FEC on adapters manually, you can enable FEC on Brocade switches using appropriate Fabric OS commands.

  This feature is enabled by default and persists after driver reloads and system reboots. FEC may coexist with other port features such as QOS, TRL, trunking, BBCR, and FAA.

  Following are limitations of this feature:

  - FEC is supported only on BR-1860 and BR-1867 Fabric Adapter ports operating in HBA mode connected to 16 Gbps Brocade switches running FOS 7.1 and later
  - FEC is not supported when on host bus adapter ports operating in loop mode or in direct-attach configurations.

- Interrupt Coalescing

  This feature provides a method to delay generation of host interrupts and thereby combines (coalesce) processing of multiple events. This reduces the interrupt processing rate and reduces the time that the CPU spends on context switching. You can configure the following parameters per port to adjust interrupt coalescing:

  - Interrupt time delay. There is a time delay during which the host generates interrupts. You can increase this delay time and thereby coalesce multiple interrupts events into one. This results in fewer interrupts for interrupt events.
  - Interrupt latency timer. An interrupt is generated when no new reply message requests occur after a specific time period. You can adjust this time period and thereby minimize I/O latency.

- I/O Execution Throttle

  This feature allows you to set maximum Fibre Channel Protocol (FCP) exchanges for a port to reduce the number of exchanges on the link and prevent a “queue full” error status back to the initiator. Use this feature in cases where target devices have a known small queue depth value to prevent SCSI queue-full conditions. You can configure, clear, and query FCP exchange values for a specific PCI function of a vHBA using **BCU fcpim** commands. The configuration persists with system reboots. For configuration details, refer to the *QLogic BR Series Adapter Administrator’s Guide*.

- LUN masking.

  LUN masking establishes access control to shared storage to isolate traffic between different initiators that are zoned in with the same storage target. LUN masking is similar to zoning, where a device in a specific zone can communicate only with other devices connected to the fabric within the same zone. With LUN masking, an initiator port is allowed to only access those LUNs identified for a specific target.

  Enable LUN masking on an adapter physical port through the HCM **Basic Port Configuration** dialog box and the BCU **fcpim –lunmaskadd** command to identify the logical port (initiator) and remote WWN (target) for the LUN number. Refer to the *QLogic BR Series Adapter Administrator’s Guide* for more information on configuration. You can also enable LUN masking using your systems UEFI HII. Refer to “Configuring UEFI” on page 255 for details.

  This feature has following limitations.

  - Only 16 LUN masking entries are allowed per physical port
  - Multiple BCU instances for adding and deleting LUN masking are not supported
  - This feature is only supported on QLogic host bus adapters and on Fabric Adapter ports configured in HBA mode.

  You can configure LUN masking for a particular target even without the actual devices being present in the network.

  When configuring boot over SAN, mask the boot LUN so that the initiator has exclusive access to the boot LUN. Refer to the *QLogic BR Series Adapter Administrator’s Guide* for more information.

- Management APIs for integration with a Management application, such as Network Advisor, and other management frameworks.
- Management support for Storage Management Initiative Specification (SMI-S).
- N_Port ID Virtualization (NPIV)

  Allows multiple N_Ports to share a single physical N_Port. Multiple Fibre Channel initiators can share this single physical port and reduce SAN hardware requirements.
- N_Port Trunking works in conjunction with the Fibre Channel trunking feature on Brocade switches, whereby the Fabric Operating System (OS) provides a mechanism to trunk two switch ports of the same port group into one link. When trunking is enabled, two physical ports belonging to the same QLogic dual-port adapter are trunked together to form a single pipe. This provides advantages such as the following:
  - Simplified management; for example, zoning and VM setup only require one WWN instead of two if using two different ports.
  - More VMs can be deployed on a single server.
  - Higher throughput for such applications as video streaming.
  - Single failures within a port group are completely transparent to upper-level applications.

NOTE

N_Port Trunking is not supported on QLogic mezzanine adapters.

The Trunking license must be installed on the switch connected to the host bus adapter port or Fabric Adapter port configured in HBA mode.

Before enabling trunking, consider the following requirements:

- When trunking is enabled, a trunked logical port (Port 0) is created and reported per host bus adapter or Fabric Adapter port configured in HBA mode. Most BCU commands are applicable in this logical port's context only.
- When configuring Fabric Zones and LUN Masking for Storage, use the PWWN for adapter port 0.
- Both adapter ports should be connected to the same port group on the switch.
- Only two ports on the same adapter can participate in trunking and both of these should be operating at the same speed.

- ❑ N_Port Trunking is supported on dual port host bus adapter and Fabric Adapter models only.
- ❑ To enable or disable trunking on the adapter, you must perform configuration tasks on both the switch using Fabric OS commands, as well as the adapter using BCU commands and HCM. Refer to the *Brocade Fabric OS Administrator's Guide* and *QLogic BR Series Adapter Administrator's Guide* for details.

- Point-to-point topology.
- PowerPC support

  QLogic Fabric Adapter ports configured in HBA mode support PowerPC extended error handling (EEH) for Linux on IBM POWER-based pSeries and iSeries systems. For Fabric Adapters, this support is limited to RHEL 6.2 and SLES 11 SP1.

NOTE

PowerPC is not currently supported for boot over SAN applications.

- Quality of Service (QoS) feature working in conjunction with the QoS feature on Brocade switches to assign high, medium (default), or low traffic priority to a given source or destination traffic flow.

  Default bandwidth settings for QoS priority levels are 60% for high, 30% for medium, and 10% for low. You can use BCU commands to change these percentages. Refer to the *QLogic BR Series Adapter Administrator's Guide* for more information. Note that set percentages are the percentage of the available link speed. Therefore, setting 25% for an 8 Gb link, would be 2 Gb.

  You also can change the percentages for high, medium, and low bandwidth for a port using UEFI screens. Refer to "Using Storage menu options" on page 257.
- Server Application Optimization (SAO). When used with Brocade storage fabrics with enabled SAO licensing, QLogic BR-Series host bus adapters and Fabric Adapter ports configured in HBA mode can use advanced Adaptive Networking features, such as QoS, designed to ensure Service Level Agreements (SLAs) in dynamic or unpredictable enterprise-class virtual server environments with mixed-SLA workloads.
- Support for Hyper-V. Hyper-V consolidates multiple server roles as separate virtual machines (VMs) using the Windows Server 2008 R2 operating system and provides integrated management tools to manage both physical and virtual resources.

- Support for Windows Preinstallation Environment (WinPE), a minimal operating system with limited services for Windows Server or Windows Vista used for unattended deployment of workstations and servers. WinPE is designed for use as a standalone preinstallation environment and as a component of other setup and recovery technologies. WinPE is supported by QLogic Windows Server 2008 R2 adapter drivers.
- Support for Windows Server Core, a minimal server option for Windows Server 2008 R2 operating systems that provides a low-maintenance server environment with limited functionality. All configuration and maintenance is done through command line interface windows or by connecting to a system remotely through a management application. Windows Server Core is supported by Windows Server 2008 R2 adapter drivers.
- Support for MSI-X, an extended version of Message Signaled Interrupts (MSI), defined in the PCI 3.0 specification. MSI-X helps improve overall system performance by contributing to lower interrupt latency and improved utilization of the host CPU. MSI-X is supported by Linux RHEL 5, RHEL 6, SLES 10, SLES 11, and ESX Server 5.0 and 5.5.
- Target rate limiting.

  You can enable or disable this feature on specific ports. Target rate limiting relies on the storage driver to determine the speed capability of a discovered remote ports, and then uses this information to throttle FCP traffic rates to slow-draining targets. This reduces or eliminates network congestion and alleviates I/O slowdowns at faster targets.

  Target rate limiting is enforced on all targets that are operating at a speed lower than that of the target with the highest speed. If the driver is unable to determine a remote port's speed, 1 Gbps is assumed. You can change the default speed using BCU commands. Target rate limiting protects only FCP write traffic.
- Target Reset Control. As part of error recovery for I/O requests, operating systems rely on logical unit reset, target reset, and bus reset in that order. While logical unit reset affects the logical unit where the I/O request encountered an error, target reset affects all logical units configured for the specified target. In configurations with a tape target, a target reset issued while a backup job is running can cause the job to abort on all logical units created for the target. Target Reset Control allows you to specifically disable resets for specific targets, thereby preventing effects on other logical units.

The BCU command **fcpim --trs_disable port_id rpwwn** <-*l lpwwn*> disables target reset for a remote port specified by the rpwwn parameter. By default, the base port is considered the initiator, unless the logical port is specified with the *-l* option. If target reset is disabled on an I-T (initiator-target) nexus, a target reset will not be allowed from the host operating system or in certain cases a third-party user application. If allowed, the target is reset. A maximum of 16 I-T nexuses can be configured to have target resets disabled.

Other related BCU commands include **fcpim --trs_query** to display a list of initiator vs. target WWNs with target reset disabled and **fcpim --trs_enable** to enable target reset. For more information on BCU commands, refer to the *QLogic BR Series Adapter Administrator's Guide*.

A bus reset issues target resets to all targets on a specific bus. Targets are not reset for which target reset has been disabled with a BCU command.

- vHBA

  Virtual HBAs (vHBAs) are virtual port partitions that appear as virtual or logical HBAs to the host operating system. Multiple vHBAs are not supported, therefore you cannot create or delete them from an adapter. For more information, refer to"I/O virtualization" on page 28.

Operating system considerations and limitations

This section lists exceptions for adapter and feature support for specific host system operating systems. Assume that features not listed in this section are fully supported by Windows, Linux, Solaris, VMware ESX and ESXi versions described under "Host operating system support" on page 70.

Windows

- Storport miniport driver—Supported.
- SCSI miniport driver—Not supported.
- Hyper-V—Supported by Windows Server 2008 R2 and later.
- Windows 7—Supported by Windows Server 2008 R2 x64 drivers.
- WinPE—Only supported by Windows Server 2008 R2 and later network and storage drivers.
- BR-1867 adapter—Not supported by WinPE.
- Windows Server Core—Only supported on Windows Server 2008 R2 systems and later.
- BNI Driver—Supported on Windows Server 2008 R2 systems only.

- MSI-X—Supported by Windows Server 2008 R2 and later.
- Team Virtual Machine Queue (VMQ)—Supported by Windows Server 2008 R2 and later. Virtual machines must be running Windows 7 or Windows Server 2008 R2 with Integration Services Setup disk installed.

Linux

- PowerPC support—Support in only technology preview mode for Fabric Adapters ports configured in HBA mode for RHEL 6.2 and SLES 11 SP1.
- MSI-X—Supported by RHEL 5, RHEL 6, SLES 10, and SLES 11.

Citrix XenServer

This does not support HCM or QASI.

VMware

- Multiple Transmit Priority Queues - only supported by ESX 5.0 or later.
- MSI-X—Supported by ESX 5.0 and ESXi 5.x.
- HCM—ESXi systems can support HCM when CIM Provider is installed on these systems using the ESXi Management feature.
- QASI—Not supported on VMware systems. QASI will install HCM on VMware guest systems.
- Network Boot—Not supported on VMware systems.

Solaris

- BR-804 adapter—Not supported.
- BR-1867 adapter—Not supported.
- BR-1007 adapter—Not supported.
- ISCSI over DCB—Not supported.
- NPIV—Not supported.
- Authentication—Not supported.
- FDMI—Not supported.
- Only the Leadville-based storage driver supported.

Oracle Linux

- BR-1867 adapter—Supported.
- BR-1007 adapter—Not supported.

Adapter management features

The Host Connectivity Manager (HCM) and QLogic Command Line Utility (BCU) are the primary management tools for host bus adapters, CNAs, and Fabric Adapters. You can install HCM as an optional application through the QLogic Adapter Software Installer (QASI). BCU automatically installs with the driver package. This section summarizes some of the features available with these tools for managing CNAs, host bus adapters, and Fabric Adapters.

The Brocade Network Advisor also provides management features for adapters, such as adapter discovery, in-context launch of HCM, authentication, and other features. Refer to the *Brocade Network Advisor SAN User Manual* for more details:

Simple Network Management Protocol provides an industry-standard method of monitoring and managing CNAs and Fabric Adapter ports configured in CNA or NIC mode. Refer to “Simple Network Management Protocol” on page 67 for details.

For the BR-1007 CNA and the BR-1867 host bus adapter, BIOS and UEFI boot code support Advanced Management Module (AMM) connectivity for configuring SAN and LAN connections SAN target selection, and WWN virtualization. The BR-1007 CNA also supports BladeCenter Open Fabric Manager (BOFM) and the BR-1867 adapter supports Open Fabric Manager (OFM). For more information, refer to “BladeCenter Open Fabric Manager (BOFM)” on page 66.

This section describes the features associated with all models of the following types of QLogic BR-Series Adapters:

- Fabric Adapters - Refer to the following subsections depending on your configured port mode and SFP transceiver configurations:
  - “General adapter management” on page 64.
  - “CNA management” on page 65 for ports configured in CNA or NIC modes.
  - “Host bus adapter management” on page 68 for ports configured in HBA mode.
  - “NIC management” on page 68 for ports configured in NIC mode.
  - “Fabric Adapter management” on page 65
- CNAs - Refer to the following subsections:
  - “General adapter management” on page 64.
  - “CNA management” on page 65.
- Host bus adapters - Refer to the following subsections:
  - “General adapter management” on page 64.

❑ “Host bus adapter management” on page 68.

HCM hardware and software requirements

Following are the minimum requirements to support HCM:

- Single-processor or multiprocessor server or workstation.
- Pentium® III with 450 MHz (or equivalent) or greater for Windows, Linux Red Hat, Novell, Solaris x86, Sun Ultra 60 for Solaris SPARC.
- At least 256 Mb of physical RAM (512 Mb recommended).
- Video card capable of at least 256 colors and a screen resolution of 800 x 600 pixels.
- At least 150 Mb disk space.
- Internet Explorer® (7.0 or later). Firefox® (3.0 or greater) is required for Webstart.
- TCP/IP protocol stack for communications to management agents on hosts containing a supported QLogic BR-Series Adapter.

General adapter management

Use BCU commands and HCM for installing, configuring, troubleshooting, and monitoring the adapter and device connections. General host bus adapter, CNA, and Fabric Adapter management functions include the following:

- Discovery of adapters and connected storage devices
- Adapter diagnostics
- Event notifications for adapter conditions and problems
- Supportsave
- Port statistics
- Host security authentication
- Port logging level configuration
- Port configuration
- Virtual port configuration
- Virtual port statistics display
- Logical port statistics display
- Interrupt control coalescing
- Performance monitoring

Fabric Adapter management

Use BCU commands, HCM, UEFI HII, and Simple Network Management Protocol (SNMP) to manage Fabric Adapter ports. For a summary of available management features using HCM and BCU, refer to one of the following sections, depending on whether the Fabric Adapter port is configured in CNA, host bus adapter, or NIC modes.

- Port set to CNA mode - “CNA management” on page 65
- Port set to HBA mode - “Host bus adapter management” on page 68
- Port set to NIC mode - “NIC management” on page 68

In addition to features summarized in the preceding list of sections, there are some unique management features for Fabric Adapters, not available for host bus adapters and CNAs, including the following:

- Configure port modes (CNA, HBA, NIC)
- Create, delete, enable, and disable vNICs.
- Query for information, display statistics, and set bandwidth for vNICs.
- Discover and display vNICs
- Discover and display vHBAs
- Enable and disable vHBAs
- Query for information and display statistics for vHBAs

CNA management

Use BCU commands and HCM to manage CNAs and Fabric Adapter ports configured in CNA mode. Other available management tools include Simple Network Management Protocol (SNMP) and BladeCenter Open Fabric Manager (BR-1007 adapter only).

FCoE management

HCM and BCU provide the provides the following functions for CNAs and for Fabric Adapter ports configured in CNA mode.

- CNA port statistics display
- FCoE ports configuration
- Fibre Channel Security Protocol (FC-SP) configuration
- Enabling target rate limiting
- vHBA statistics monitoring
- Port, target, and Fibre Channel Protocol (FCP) operation monitoring
- Security features for FCoE access (FC-SP) configuration

- Virtual FCoE ports creation
- FCoE statistics display
- vNIC statistics display
- Fabric statistics display
- FCP IM Module statistics display
- Historical statistics

Data Center Bridging management

HCM and BCU provide the provides the following functions for CNAs and for Fabric Adapter ports configured in CNA mode.

- DCB port statistics
- DCB statistics
- FCP IM Module statistics
- Historical statistics

Ethernet management

HCM and BCU commands provide the provide the following functions for CNAs and for Fabric Adapter ports configured in CNA or NIC modes:

- Teaming configuration
- Ethernet port statistics display
- vNIC statistics display
- VLAN configuration
- VLAN statistics display
- Ethernet logging level configuration
- VLANs over teaming configuration
- Persistent binding configuration
- NIC teaming, and VLAN statistics monitoring
- Preboot eXecution Environment (PXE) boot configuration

BladeCenter Open Fabric Manager (BOFM)

The BR-1007 CNA and BR-1867 host bus adapter BIOS and UEFI boot code support Advanced Management Module (AMM) connectivity for configuring SAN and LAN connections, SAN target selection, and WWN virtualization. The BR-1007 CNA also supports BladeCenter Open Fabric Manager (BOFM) and the BR-1867 adapter supports Open Fabric Manager (OFM). For more information, refer to the *User's Guide* shipped with your adapter.

NOTE

For CNAs, BOFM support in the QLogic BR-Series Adapter Option ROM expects non-zero values for both PWWN and NWWN for the FCoE port. If any of these values are zero, the FCoE link will not come up, and the port status will display as **Linkdown**. Be sure to configure valid non-zero values for PWWN/NWWN when using BOFM.

Simple Network Management Protocol

Simple Network Management Protocol (SNMP) is supported by CNAs and by Fabric Adapter for ports configured in CNA or NIC mode.

SNMP is an industry-standard method of monitoring and managing network devices. This protocol promotes interoperability because SNMP-capable systems must adhere to a common set of framework and language rules. SNMP is based on manager-agent model consisting of an SNMP manager, an SNMP master-agent, a database of management information (MIB), managed SNMP devices, and the SNMP protocol.

QLogic CNA and Fabric Adapters provide the agent and management information base (MIB). The SNMP master agent provides an interface between the manager and the managed physical device(s) and uses the SNMP protocol, to exchange information defined in the MIB. QLogic BR-Series Adapter SNMP support is through an extension to the master agent, called the subagent, which processes SNMP queries for QLogic BR-Series Adapters. The subagent is only supported on Linux and Windows systems. SNMP subagent files are copied to your host system when you install adapter software through HCM and the QLogic Adapter Software Installer (QASI). You can then elect to install the subagent using QLogic Windows or Linux installer scripts.

The agent accesses information about the adapter and makes it available to an SNMP network management station. When active, the management station can get information or set information when it queries the agent. The agent uses variables (also known as managed or MIB objects) to report data such as the following.

- Model number
- Type of adapter
- Serial number
- Current status
- Hardware version
- Port statistics
- VLAN attributes and statistics

- Team attributes and statistics

The SNMP master agent also sends unsolicited messages (called traps) to the manager. These traps, generated by the QLogic SNMP subagent, are for network adapter conditions that require administrative attention. Adapter traps included notification of VLANs added or removed; team members added or removed; team failover, failback, team added, and team removed; and port link up and link down events.

All managed objects are contained in the MIB provided by the adapter. For details on MIB groups and objects supported by QLogic BR-Series Adapters, refer to B, “MIB Reference”.

NIC management

Ports on Fabric Adapters only can be set to operate in NIC mode. These ports appear as 10 GbE NICs to the host operating system.

BCU commands and HCM provide features for configuring, troubleshooting, and monitoring NIC connections to the Ethernet LAN. For an overview, refer to “Ethernet management” on page 66. For details, refer to the *QLogic BR Series Adapter Administrator’s Guide* for full information.

In addition, BCU commands and HCM provide the following features specifically for NIC management when Fabric Adapter ports configured in NIC or CNA mode:

- vNIC configuration (only available using BCU commands)
- vNIC teaming configuration
- vNIC statistics
- vNIC discovery and display in HCM
- vNIC enable and disable

SNMP provides an industry-standard method of monitoring and managing Fabric Adapters with ports configured in NIC mode. For details, refer to “Simple Network Management Protocol” on page 67.

Management applications, such as Network Advisor, provides management support for NICs, including host and NIC discovery, in-context launch of HCM, statistics display, port and adapter property display, and other features. Refer to the *Brocade Network Advisor SAN User Manual*.

Host bus adapter management

BCU commands and HCM provide the following features for host bus adapters and for Fabric Adapter ports configured in HBA mode:

- Port statistics
- Logical port statistics

- Firmware statistics
- QoS statistics
- Discovery of adapters and connected storage devices in your SAN
- Adapter configuration
- Persistent binding
- End-to-end QoS
- Target rate limiting
- Performance monitoring, such as port and target statistics
- Supportsave operation
- Adapter diagnostics display
- N_Port trunking configuration
- Adapter, port, target, and Fibre Channel Protocol (FCP) operation monitoring
- Security features for adapter access.
- Event notifications for adapter conditions and problems.
- Monitor and analyze traffic between N_Port pairs through a mirrored port on the switch (HBA Analyzer)
- Virtual FC ports creation
- vHBA statistics display
- FCP IM Module statistics display
- FCP-IM IOP statistics
- Target statistics
- Fabric statistics display
- Port configuration
- LUN masking configuration
- Historical statistics

HCM and BCU commands provide the following features for QLogic Fabric Adapter ports configured in HBA and CNA mode:

- vHBA discovery and display in HCM
- vHBA enable and disable
- vHBA data query
- vHBA statistics display

Host operating system support

This section provides details on host operating system support for features, adapters, adapter drivers, and HCM.

Adapter drivers

Table 1-7 provides general information on compatible software operating systems and environments for QLogic BR-Series Adapter network and storage drivers.

NOTE

In the following table detailing driver support in various operating systems and platforms, “N/A” indicates that support is not available in the OS architecture.

Table 1-7. Operating system support for network and storage drivers

Operating System	x86	x64	IA-64	SPARC
Windows				
Windows Server 2008[1] R2 SP1[4]	N/A	Yes	No	No
Windows SBS 2011	N/A	Yes	No	N/A
Windows 7[1]	Yes	Yes	No	No
Windows Server 2012	N/A	Yes	N/A	N/A
Windows Server 2012 R2	N/A	Yes	N/A	N/A
Microsoft WinPE 3.x for Windows Server 2012	Yes	Yes	No	No
Linux				
Red Hat Enterprise Linux (RHEL) 5.7, 5.8, 5.9, 5.10, 6.2, 6.3, 6.4, 6.5	Yes	Yes	No	No
SUSE Linux Enterprise Server (SLES) 10.3, 10.4, 11.1, 11.2[2]	Yes	Yes	No	No
Citrix® XenServer® 5.6, 6.0, 6.1	No	Yes	No	No
Solaris				
Solaris 10, 11	Yes	Yes	No	No
VMware ESX/ESXi				

Table 1-7. Operating system support for network and storage drivers (Continued)

Operating System	x86	x64	IA-64	SPARC
ESXi 5.x	N/A	Yes	N/A	N/A
Oracle Linux (OL) 5.9, 5.10, 6.4, 6.5	Yes	Yes	N/A	N/A
Oracle VM 3.0	Storage driver supported -32b	N/A	N/A	N/A

1. Supported by Windows Server 2008 R2 drivers.
2. If updating the errata kernel on SLES 11 SP1 systems after installing the driver, refer the “Linux” section under “Installation notes” on page 108 for instructions.

Hypervisor support

Table 1-8 lists Hypervisor support in various operating systems and platforms. “N/A” indicates that support is not available in the OS architecture.

Table 1-8. Hypervisor support for QLogic BR-Series Adapters

System	x86	x64	Intel IA64	SPARC
VMware ESXi 5.0	N/A	Yes	N/A	N/A
VMware ESXi 5.1	N/A	Yes	N/A	N/A
VMware ESXi 5.5	N/A	Yes	N/A	N/A
Windows Server 2008 R2	N/A	Yes	N/A	N/A
Windows Server 2012	N/A	Yes	N/A	N/A
Windows Server 2012 R2	N/A	Yes	N/A	N/A
RHEL 6.x	N/A	Yes	N/A	N/A
Linux XEN	yes	Yes	N/A	N/A
Linux KVM	N/A	Yes	N/A	N/A
Oracle VM 3.0	N/A	Yes	N/A	N/A
Citrix XenServer 5.6, 6.0 and 6.1	N/A	Yes	N/A	N/A

NOTE

For the latest support information on specific operating system release levels, service pack levels, and other patch requirements, please refer to the latest release notes for your adapter.

Adapters and network technology

This section describes operating system support for the QLogic BR-Series Adapters and their supported network technologies:

- Fabric Adapters - Refer to the following subsections depending on your port mode and SFP transceiver configurations:
  - "FCoE support" on page 73 and "Ethernet support" on page 74 for ports configured in CNA mode.
  - "Fibre Channel support" on page 73, for ports configured in HBA mode.
  - "Ethernet support" on page 74 for ports configured in NIC mode.
- CNAs - Refer to the following subsections:
  - "FCoE support" on page 73
  - "Ethernet support" on page 74.
- Host bus adapters - Refer to "Fibre Channel support" on page 73.

NOTE

Specific operating system release levels, service pack levels, and other patch requirements are detailed in the current adapter release notes.

To keep drivers and boot code synchronized, be sure to update your adapter with the latest boot code image. To download boot code, use the following steps:

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the driver or boot code link at the top of the page to direct you to the driver or boot code packages.
4. Locate the driver or boot code package for your adapter in the table, click on it, and then follow the directions.

Fibre Channel support

The following operating systems support Fibre Channel operation for host bus adapters and for Fabric Adapter ports configured in HBA mode:

- Windows Server 2008 R2 SP1 (x64)
- Windows Server 2012 (x64)
- Windows Server 2012 R2 (x64)
- Windows SBS 2011 (x64)
- Microsoft Hypervisor (refer to Table 1-8)
- Linux RHEL 5.7, 5.8, 5.9, 5.10, 6.2, 6.3, 6.4 and 6.5 (x86 and x64)
- Linux SLES 10.3, 10.4, 11.1 and 11.2 (x86 and x64) and 11.3
- Citrix XenServer 5.6, 6.0 and 6.1 (x64)
- Solaris 11 (x64, and SPARC)
- ESXi 5.0, 5.1 (x64) and 5.5
- Oracle Linux (OL) 5.9, 5.10, 6.4 and 6.5 (x86 and x64)
- Oracle VM 3.0

FCoE support

The following operating systems support FCoE operation for QLogic CNAs and Fabric Adapter ports configured in CNA mode:

- Windows Server 2008 R2 SP1 (x64)
- Windows Server 2012 (x64)
- Windows Server 2012 R2 (x64)
- Windows SBS 2011 (x64)
- Microsoft Hypervisor (refer to Table 1-8 on page 71)
- Linux RHEL 5.7, 5.8, 5.9, 5.10, 6.2, 6.3, 6.4, and 6.5 (x86 and x64)
- Linux SLES 10.3, 10.4, 11.1 and 11.2 (x86 and x64) and 11.3
- Citrix XenServer 5.6, 6.0 and 6.1 (x64)
- Solaris 10, 11 (x86, x64, and SPARC)
- ESXi 5.0, 5.1 (x64) and 5.5

NOTE

Drivers and BCU are supported on the VMware ESX platforms. HCM is supported only on the guest system on VMware.

- Oracle Linux (OL) 5.9, 5.10, 6.4 and 6.5 (x86 and x64)

Ethernet support

The following operating systems support Ethernet operation for QLogic CNAs and Fabric Adapter ports configured in CNA or NIC modes:

- Windows 2008 SP2 (x86 and x64)
- Windows 2008 R2 SP1 (x64)
- Windows Server 2012 (x64)
- Windows SBS 2011 (x64)
- Microsoft Hypervisor (refer to Table 1-8 on page 71)
- Linux RHEL 5.7, 5,8, 5.9, 5.10, 6.2, 6.3, 6.4, and 6.5 (x86 and x64)
- Linux SLES 10.3, 10.4, 11.1 and 11.2 (x86 and x64)
- Citrix XenServer 5.6, 6.0 and 6.1 (x64)
- Solaris 10, 11 (x86, x64, and SPARC)
- Xen Hypervisor (x86 and x64)

  Refer to “Host operating system support” on page 70.
- ESXi 5.0 and 5.1 (x64)
- Oracle Linux (OL) 5.9, 5.10, 6.4 and 6.5 (x86 and x64)

Host Connectivity Manager (HCM)

The following operating systems support HCM management for adapters:

- Windows Server 2008 SP2 (x86 and x64)
- Windows Server 2008 R2 SP1 (x64)
- Windows SBS 2011 (x64)
- Windows XP®
- Windows Vista
- Windows Server 2012 (x64)
- Linux RHEL 5.7, 5.8, 5.10, 6.2, 6.3, 6.4 and 6.5 (x86 and x64)

NOTE

Be sure to use the x64 software installer for Linux x64 systems.

- Linux SLES 10.3, 10.4, 11.1, and 11.2, (x86 and x64)
- Solaris 10, 11, except Open Solaris, (x86, x64, and SPARC)

- ESXi 5.0 and 5.1 (x64)
- Oracle Linux (OL) 5.9, 5.10, 6.4 and 6.5 (x86 and x64)

NOTE

Specific operating system service patch levels and other patch requirements are detailed in the current release notes for your adapter software version.

HCM and BNA support on ESXi systems

Through the QLogic BR-Series Adapters ESXi Management feature, ESXi systems can support HCM and the Brocade Network Advisor (BNA) when CIM Provider is installed on these systems. This feature will not support collecting Support Save data or updating boot code through HCM or BNA.

The following options are available to update boot code:

- Use the Live CD ISO file that you can download from the QLogic Web Site at http://driverdownloads.qlogic.com. For instructions on using the LiveCD, refer to “Boot systems over SAN without operating system or local drive” on page 240.
- Update boot code through the CIM Provider software update subprofile.

For installation and other information on CIM Provider, reference the following publications:

- *CIM Provider for QLogic BR-Series Adapters Developer’s Guide*
- *CIM Provider for QLogic BR-Series Adapters Installation Guide*

Adapter software

QLogic BR-Series Adapter software includes the appropriate driver package for your host system, management utilities, and the HCM application. You can install all of these components or individual components using the QLogic Adapter Software Installer (QASI) GUI-based application or commands.

Driver packages

A single adapter driver “package” is available for installing to each supported host operation system and platform. Refer to “Software installation and driver packages” on page 81 for a list of packages for each support host systems.

Each driver package contains the following components:

- Driver for your host system. In most cases, both the required storage and network drivers are included in installation packages. For systems not supporting network drivers, only the storage driver is included.
- Firmware

Firmware is installed in the adapter's on-board flash memory and operates on the adapter's CPU. It provides an interface to the host device driver and off-loads many low-level hardware-specific programming tasks typically performed by the device driver. The firmware provides appropriate support for both the storage and network drivers to manage the hardware. Depending on the adapter model, it also provides the following functions:

- ❑ For CNAs and for Fabric Adapters with ports configured in CNA mode, it manages the physical Ethernet link to present an Ethernet interface to the network driver and a virtual FCoE link to the storage driver once DCB compliance is established for the link.
- ❑ For Fabric Adapters with ports configured in NIC mode, it manages the physical Ethernet link to present an Ethernet interface to the network driver.

NOTE

The LLDP/DCBCXP engine is implemented in the firmware. Therefore, any other instance of LLDP agent or software must not be used with a CNA or Fabric Adapter port configured in CNA mode.

- ■ Management utilities. For more information, refer to "Management utilities" on page 77.

Three types of adapter drivers are provided in installation packages:

- ■ Storage driver (all adapters)

  This driver provides Fibre Channel frame transport for QLogic host bus adapters and Fabric Adapter ports configured in HBA mode, as well as FCoE transport for QLogic CNAs. The installer logic detects either a FCoE or Fibre Channel network and the appropriate driver support is provided automatically.

NOTE

The storage driver will claim all installed QLogic BR-Series Adapters installed in a system. This driver will be used instead of the driver originally installed for these adapters.

- ■ Network driver (CNAs and Fabric Adapters only)

  Driver for frame transport over Ethernet and basic Ethernet services. This driver only applies to CNAs and Fabric Adapter ports configured in CNA mode only.

- Intermediate driver (CNAs and Fabric Adapters only)

  For Windows Server 2008 R2 systems only, this provides support for multiple VLANs on ports and teams. This driver applies to CNAs and to Fabric Adapter ports configured in CNA or NIC mode. Note that installing this driver changes the behavior of the network driver because it alters the binding of the driver and protocols in the network stack. Before installing the intermediate driver, network traffic goes from the protocols layer to the network driver directly. After installation, virtual LANs created by BCU commands or HCM options are directly bound to upper protocols. All traffic goes from the protocols layer to the VLANs, and then to the network driver. You should not enable TCP, IPV4, or other protocols or services for the network driver after installing the intermediate driver.

NOTE

For Windows Server 2012, the BNI driver is not installed because teaming and VLAN are natively supported by the Windows 2012 operating system

NOTE

Installing the wrong firmware or adapter driver update might cause the adapter or switch to malfunction. Before you install a firmware or update the driver, refer to all readme and change history files that are provided with the driver or firmware. These files contain important information about the update and the procedure for installing the update, including any special procedure for updating from an earlier firmware or driver version.

Management utilities

The following management Utilities are included with all driver packages.

- QLogic BCU CLI (BCU)

  An application from which you can enter commands to monitor, install, and configure QLogic BR-Series Adapters.

- QLogic Adapter Software Installer (QASI).

  This includes a GUI-based installer and command-line installer that provides options for installing all adapter drivers, all adapter drivers and HCM, or HCM only for a specific operating system and platform.

- Installer scripts.

  These allow you to install drivers, the HCM agent, and utilities to your host system without using the Adapter Software Installer. First, download and extract the appropriate driver package for your system from http://driverdownloads.qlogic.com., then run the script. Refer to Table 1-9 for the installer script commands for Windows, Linux, and VMware systems.

Table 1-9. Installer script commands

Operating system	Download file	Script command
Windows	Refer to Table 1-10 on page 83 for .exe file.	brocade_installer.bat
RHEL	Refer to Table 1-10 on page 83 for .tar.gz file.	brocade_install_rhel.sh
SLES	Refer to Table 1-10 on page 83 for .tar.gz file.	brocade_install_sles.sh
Citrix XenServer	Refer to Table 1-10 on page 83 for .tar.gz file.	install.sh
VmWare ESXi 5.X	Refer to Table 1-10 on page 83 for .tar.gz file.	brocade_install_esxi.sh
Solaris[1]	Refer to Table 1-10 on page 83 for .tar.gz file.	brocade_install.sh
Oracle Linux	Refer to Table 1-10 on page 83 for .tar.gz file	brocade_install.sh

1. After installing software, you must reboot Solaris systems.

- HCM agent

  The agent provides an interface for managing adapters installed on the host through the HCM application.

NOTE

The HCM agent is supported on VMware ESX systems. Through the ESXi Management feature ESXi servers can be managed by HCM remotely if CIM Provider is installed on the server.

- CIM Provider

  CIM Provider packages installed on your host system allow any standard Common Information Model (CIM) and SMI-S-based management software to manage installed QLogic BR-Series Adapters.

  NOTE

  The CIM Provider files do not load when you use the QLogic Adapter Software Installer (QASI) to install driver packages.

  If you want to integrate the provider with Common Information Model Object Manager (CIM OM), install the SMI-S Provider packages using instructions in the *CIM Provider for QLogic BR-Series Adapters Installation Guide*.

  Although SMI-S Provider and CIM Provider may be used interchangeably, CIM is the more generic term, while SMI-S is storage-specific.

- SNMP subagent.

  Simple Network Management Protocol (SNMP) is an industry-standard method of monitoring and managing network devices. SNMP is supported by CNAs and by Fabric Adapter ports configured in CNA or NIC mode. SNMP support is provided through an extension to the SNMP master agent, called the subagent, which processes SNMP queries for QLogic BR-Series Adapters. The subagent is only supported on Linux and Windows systems. For more information on SNMP support, refer to “Simple Network Management Protocol” on page 67.

  SNMP subagent files are copied to your host system when you install adapter software through HCM and the QLogic Adapter Software Installer (QASI). You can elect to install the subagent using QLogic Windows or Linux installation scripts. Refer to “Installing SNMP subagent” on page 180.

Host Connectivity Manager

Host Connectivity Manager (HCM) is a graphical user interface (GUI) based management software for installing, configuring, monitoring, and troubleshooting installed adapters. HCM performs the “client” function for the management software. You can only install HCM using the QLogic Adapter Software Installer. The HCM agent is installed with the driver package on systems where adapters are installed.

Install HCM on the host system containing QLogic BR-Series Adapters for local management or install on a network-attached system for remote management of these adapters. Refer to “CNA management” on page 65 or “Host bus adapter management” on page 68 for more information. HCM is available for all commonly used operating systems, such as Windows, Solaris, and Linux platforms. HCM is supported on VMware, but only when installed on the “guest” operating system. HCM is not supported on VMware ESXi systems.

NOTE

HCM is compatible with any version of the driver package. HCM can also manage the current version, as well as all previous versions of the HCM agent. The HCM agent is not supported on VMware ESXi systems, but is supported on VMware ESX systems.

Boot code

The adapter boot code supports the following:

- PCI BIOS 3.1 or later

  Boot code for PCI system

- SMBIOS specification version 2.4 or later

  System Management BIOS

- BIOS

  Boot code for x86 and x64 platforms

- Unified Extensible Firmware Interface (UEFI)

  Boot code for UEFI systems

- Adapter firmware

The adapter boot code loads from adapter memory into system memory and integrates with the host system (server) BIOS during system boot to facilitate booting from LUNs, which are also referred to as “virtual drives,” “boot disks,” and “boot devices.”

To keep drivers and boot code synchronized, be sure to update your adapter with the latest boot code image. To download boot code, go to http://driverdownloads.qlogic.com locate the boot code package by adapter type, adapter model, and operating system.

Starting with Adapters v3.2.3.0 and later, patch versions of adapter driver firmware will be available in boot code for updating installed adapters

You can download driver packages to configure boot LUNs and boot images for adapters installed in systems without operating systems or hard drives. Refer to “Boot code updates” on page 189 for complete information.

CIM Provider

CIM Provider allows third-party SMI-S and CIM-based adapter management software to manage QLogic BR-Series Adapters installed on a host system.

The CIM Provider files do not load when you use the QLogic Adapter Software Installer. The CIM Provider software is available at http://driverdownloads.qlogic.com under the adapter type, adapter model, and operating system.

For more information on CIM Provider, including operating systems supported and available installation packages, refer to the *CIM Provider for QLogic BR-Series Adapters Installation Guide*.

NOTE

Although SMI-S Provider and CIM Provider may be used interchangeably, CIM is the more generic term. SMI-S is storage-specific.

Adapter event messages

When applicable events occur during adapter operation, the adapter driver generates event messages. These messages are captured in your host system logs and also display in the HCM master log. All of these event log messages are contained in HTML files that load to your system when you install adapter drivers. You can view these HTML files using any Internet browser application.

For details on event messages, event log locations on supported operating systems, and where adapter event message HTML files are loaded to your host system, refer to the “Tools for Collecting Data” chapter in the *QLogic BR-Series Adapters Troubleshooting Guide*. In addition, you can view all event messages in the “Message Reference” appendix of the same guide.

Software installation and driver packages

Table 1-10 on page 83 describes the software installation packages that you can download for each supported host platform. The table provides the package name, host system supported, and package description. Using the table, you can select the following to download for your specific host platform:

- The QLogic Adapter Software Installer (.exe) application to install the driver package, HCM, or driver package and HCM. Installation instructions are provided under “Using the QLogic Adapter Software Installer” on page 113.

- A driver package that you can install using an installation script or “native” procedures for your host’s operating system. Installation procedures are provided under “Using software installation scripts and system tools” on page 138.

Download the driver package and boot image for your host system operating system and platform using the following steps:

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the driver or boot code link at the top of the page to direct you to the driver or boot code packages.
4. Locate the driver or boot code package for your adapter in the table, click on it, and then follow the directions.

NOTE

In the package name, <version> indicates the software version number (for example v2-0-0), which will change for each release. The <*platform*> indicates the host processor type, such as x86 or x86_64. Network drivers are not supported on host bus adapters and Fabric Adapter ports configured in HBA mode.

Although Table 1-10 lists all adapter software packages that you can download for specific operating systems and platforms, your adapter release may not be supported some of these operating systems and platforms. Refer to “Host operating system support” on page 70 and the latest release notes for your adapter for more information.

BR-804 and BR-1007 adapters are not supported on Solaris systems.

Table 1-10. Supported software installation packages

Operating System and Platform	QLogic Adapter Software Installer	Driver Package
Windows Server 2008 R2 (x64)[2]	*brocade_adapter_software_installer_windows_<version>.exe* Installs HCM and appropriate driver package.	*brocade_driver_win2008_R2_x64_<version>.exe* Storport miniport storage and network drivers with HCM Agent for Standard/Enterprise Server on EM64T and AMD64 platforms. This package also contains installer script (brocade_installer.bat).
Windows Server 2012 (x64)	*brocade_adapter_software_installer_windows_<version>.exe* Installs HCM and appropriate driver package.	brocade_driver_win2012_x64_<version>.exe Storport miniport storage and network drivers with HCM Agent for Standard/Enterprise Server on EM64T and AMD64 platforms. This package also contains installer script (brocade_installer.bat).
Windows Server 2012 R2	*brocade_adapter_software_installer_windows_<version>.exe* Installs HCM and appropriate driver package.	brocade_driver_win2012_R2_x64_<version>.exe Storport miniport storage and network drivers with HCM Agent for Standard/Enterprise Server on EM64T and AMD64 platforms. This package also contains installer script (brocade_installer.bat).
Linux RHEL and OL 5.9, 5.10 (x86)	*brocade_adapter_software_installer_linux_<version>.bin* Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[1] ■ brocade_driver_linux_rhel5_<version>.tar.gz[2]
Linux RHEL and OL 5.9, 5.10 (x86_64)	*brocade_adapter_software_installer_linux_x64_<version>.bin* [3] Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[3] ■ brocade_driver_linux_rhel5_<version>.tar.gz[4]

Table 1-10. Supported software installation packages (Continued)

Operating System and Platform	QLogic Adapter Software Installer	Driver Package
Linux RHEL and OL 6.2, 6.3, 6.4, 6.5 (x86)	*brocade_adapter_software_installer_linux_<version>.bin* Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[3] ■ brocade_driver_linux_rhel6_<version>.tar.gz[4]
Linux RHEL and OL 6.2, 6.3, 6.4, 6.5 (x86_x64)	*brocade_adapter_software_installer_linux_x64_<version>.bin*[5] Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[3] ■ brocade_driver_linux_rhel6_<version>.tar.gz[4]
Linux SLES 10 SP3 (x86)	*brocade_adapter_software_installer_linux_<version>.bin* Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[3] ■ brocade_driver_linux_sles10sp3_<version>.tar.gz[4]
Linux SLES 10 SP3 (x86_64)	*brocade_adapter_software_installer_linux_x64_<version>.bin*[5] Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[3] ■ brocade_driver_linux_sles10sp3_<version>.tar.gz[4]
Linux SLES 10 SP4 (x86)	*brocade_adapter_software_installer_linux_<version>.bin* Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[3] ■ brocade_driver_linux_sles10sp4_<version>.tar.gz[4]
Linux SLES 10 SP4 (x86_64)	*brocade_adapter_software_installer_linux_x64_<version>.bin*[5] Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[3] ■ brocade_driver_linux_sles10sp4_<version>.tar.gz[4]
Linux SLES 11 SP1 (x86)	*brocade_adapter_software_installer_linux_<version>.bin* Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[3] ■ brocade_driver_linux_sles11sp1_<version>.tar.gz[4]

Table 1-10. Supported software installation packages (Continued)

Operating System and Platform	QLogic Adapter Software Installer	Driver Package
Linux SLES 11 SP1 (x86_64)	*brocade_adapter_software_installer_linux_x64_<version>.bin*[5] Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[3] ■ brocade_driver_linux_sles11sp1_<version>.tar.gz[4]
Linux SLES 11 SP2 (x86)	*brocade_adapter_software_installer_linux_<version>.bin* Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[3] ■ brocade_driver_linux_sles11sp2_<version>.tar.gz[4]
Linux SLES 11 SP2 (x86_64)	*brocade_adapter_software_installer_linux_x64_<version>.bin*[5] Installs HCM and appropriate driver package.	■ brocade_driver_linux_<version>.tar.gz[3] ■ brocade_driver_linux_sles11sp2_<version>.tar.gz[4]
Citrix XenServer 5.6 (x64)	Not supported.	brocade_driver_linux_xen56sp2_<version>.tar.gz[4]
Citrix XenServer 6.0 (x64)	Not supported.	brocade_driver_linux_xen60_<version>.tar.gz[4]
Citrix XenServer 6.0 (x64)	Not supported.	brocade_driver_linux_xen61_<version>.tar.gz[4]
Solaris 10.0 (x86)	*brocade_adapter_software_installer_solaris_x86_<version>.bin* Installs HCM and appropriate driver package for operating system and platform.	brocade_driver_solaris10_<version>.tar[4] Leadville-based storage driver with user applications, such as HCM Agent, QLogic Adapter Software Installer, and BCU, for x86 platforms.
Solaris 10.0 SPARC (x86_64)	*brocade_adapter_software_installer_solaris_sparc_<version>.bin* Installs HCM and appropriate driver package.	brocade_driver_solaris10_<version>.tar[6] Leadville-based storage driver with user applications, such as HCM Agent, QLogic Adapter Software Installer, and BCU, for SPARC platforms.

Table 1-10. Supported software installation packages (Continued)

Operating System and Platform	QLogic Adapter Software Installer	Driver Package
Solaris 11.0 (x86)	*brocade_adapter_software_installer_solaris_x86_<version>.bin* Installs HCM and appropriate driver package for operating system and platform.	brocade_driver_solaris11_<version>.tar[6] Leadville-based storage driver with user applications, such as HCM Agent, QLogic Adapter Software Installer, and BCU, for x86 platforms.
Solaris 11.0 SPARC (x86_64)	*brocade_adapter_software_installer_solaris_sparc_<version>.bin* Installs HCM and appropriate driver package for operating system and platform.	brocade_driver_solaris11_<version>.tar[6] Leadville-based storage driver with user applications, such as HCM Agent, QLogic Adapter Software Installer, and BCU, for x86 platforms.
VMware ESXi (x64) 5.0, 5.1, and 5.5	**Note:** Use appropriate QLogic Adapter Software Installer listed in this column to install HCM on applicable "guest" operating system only. The software installer is not supported on ESX systems. The HCM agent is not supported on ESXi platforms.	*brocade_driver_esx50_<versison>.tar.gz*[6] 5.0 storage and network drivers with user applications, such as HCM Agent, QLogic Adapter Software Installer, and BCU for x86, EM64T, and AMD64 platforms.

1. This package is the source-based RPM for all RHEL and SLES Linux driver distributions, as well as user applications, such as HCM Agent, QLogic Adapter Software Installer, and BCU. The driver module is compiled on the system during the RPM installation. An installer program is available for use when you untar this package. To install this package, the appropriate distribution kernel development packages must be installed for the currently running kernel, which include the gcc compiler and the kernel sources. Although this package installs SLES drivers, the error message "bfa" or "bna" module not supported by Novell, setting U taint flag" displays. You can complete installation and use this driver although in this format it is not certified or supported by Novell, Inc.
2. This package contains the latest precompiled RPMs for either RHEL or SLES distributions, as well as user applications, such as HCM Agent, QLogic Adapter Software Installer, and BCU. An installer program is available for use when you untar this package.
3. Be sure to use this installer on Linux x64 systems.
4. This package contains all network drivers, storage drivers, management utilities, and installation script for Solaris distributions

NOTE

For the latest support information on specific operating system release levels, service pack levels, and other patch requirements, please refer to the latest release notes for your adapter.

Downloading software and documentation

To download the software installer, driver packages, boot code, driver update disks, the CIM provider, and documentation, go to http://driverdownloads.qlogic.com, and search by adapter type, adapter model, and operating system.

Downloading software for VMware systems

Besides downloading driver packages using steps under “Downloading software and documentation” on page 87, you can use the following options for VMware ESX and ESXi systems:

- Download the adapter driver CD from downloads.vmware.com and use VMware tools, such as vSphere Management Assistant (vMA), Virtual CLI (vCLI), Update Manager, and the Console Operating System (COS) or Direct Console User Interface (DCUI) to install driver packages from offline bundles. Access offline bundles from http://driverdownloads.qlogic.com.
- For VMware 5.0 and later, adapter driver packages are “inbox” with VMware. Download the driver rollup .iso file from downloads.vmware.com. Driver packages support the (Brocade) BR-1860 Fabric Adapter, BR-815, BR-825, and BR-1020 adapters.

Software installation options

You can use the QLogic Adapter Software Installer or options in “native” installation scripts and commands to install software on your host system:

- QLogic Adapter Software Installer

  Use this to install the following components:

  - ❑ Storage driver, network driver, and HCM
  - ❑ Storage and network driver
  - ❑ HCM only

  For more information, refer to “Using the GUI-based installer” on page 114.

- QLogic “native” installer scripts and commands

  For CNAs, use this to install the storage driver, network driver, and utilities.

For host bus adapters and Fabric Adapter ports configured in HBA mode, use this to install the storage driver and utilities only.

For more information, refer to “Using software installation scripts and system tools” on page 138.

NOTE

Only one driver installation is required for all types of adapters (CNA, host bus adapter, or Fabric Adapter) installed in a host system.

Refer to “Software installation and driver packages” on page 81 for a complete list of driver and software installer packages that are available at http://driverdownloads.qlogic.com.

To keep drivers and boot code synchronized, be sure to update your adapter with the latest boot code image. To download boot code, perform the following steps:

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the **Boot Code** link at the top of the page to direct you to the boot code packages.
4. Locate the boot code package for your adapter in the table, click on it, and then follow the directions.

Boot installation packages

Download boot installation packages to support boot operations, such as boot from SAN, network boot, and updating adapter boot code, from the QLogic Web Site using the following steps:

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the **Boot Code** link at the top of the page to direct you to the boot code packages.
4. Locate the boot code package for your adapter in the table, click on it, and then follow the directions.

The following boot installation packages are available:

- Driver update disk (dud) ISO files containing the appropriate driver and necessary directory structure to install with the host operating system on remote LUNs for boot over SAN operations. ISO images are available for Linux, Solaris, and VMware systems.

  NOTE

  When installing the operating system to the remote boot LUN, you must use the driver update disk (DUD) appropriate for the host operating system and platform or installation will fail. Also note that two separate DUDs are available for each operating system to provide appropriate storage and network files for your adapter model.

  For Microsoft Windows operating systems, the driver update disk does not verify prerequisite checks as part of installation. Please review the operating system prerequisites and install the necessary hotfixes after the operating system installation is complete.

- A LiveCD ISO image (live_cd.iso) containing the adapter driver, boot code, and minimum operating system to allow you to boot BIOS-based host systems that do not have installed operating systems or local drives. Once you boot the system, you can update the boot image on installed adapters and configure boot from SAN using BCU commands.

  NOTE

  To boot UEFI-based host systems, you can create a WinPE ISO image using steps under “Configuring fabric-based boot LUN discovery (Brocade fabrics)” on page 235. This image contains the adapter driver, boot code, and minimum operating system to boot systems without installed operating systems or local drives.

- Adapter boot code image. This contains BIOS and UEFI boot code and firmware used by the boot code to boot from the adapter. Load this code to option ROM on the adapter using the BCU **boot --update** command. Download this image from the QLogic Web Site using the following steps:

  a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.

  b. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.

c. Click the **Boot Code** link at the top of the page to direct you to the boot code packages.

d. Locate the boot code package for your adapter in the table, click on it, and then follow the directions.

NOTE

To keep drivers and boot code synchronized, be sure to update your adapter with the latest boot image whenever you install or update adapter driver packages. Refer to "Boot code updates" on page 189 for instructions.

Table 1-11 describes the installation packages for boot support that you can download for each supported operating system. The table provides the operating system, the driver update disk (DUD) image, the LiveCD, and the boot code.

NOTE

Although Table 1-11 lists all boot packages that you can download for specific operating systems and platforms, your adapter release may not be supported some of these operating systems and platforms. Refer to "Host operating system support" on page 70 and the latest release notes for your adapter for more information.

For the BR-1867 Fabric Adapter, you must use release 3.0.3.0 (or later) DUD and drivers.

Table 1-11. Boot installation packages

Operating System (Platform)	Driver Update Disk Image	LiveCD	Boot Code
Windows 2008 R2 (x86_64)	brocade_adapter_fc_w2k8_r2_x64_dud_<version>.zip[1] brocade_adapter_fcoe_w2k8_r2_x64_dud_<version>.zip[2]	NA	brocade_adapter_boot_fw_<version>
Windows 2012	brocade_adapter_fc_w2k8_r2_x64_dud_<version>.zip[1] brocade_adapter_fcoe_w2k8_r2_x64_dud_<version>.zip[2]	NA	brocade_adapter_boot_fw_<version>
Linux RHEL and OL 5.9, 5.10, 6.4, 6.5 (x86)	brocade_unified_adapter_rhel57_i386_dud_<version>.iso[1] brocade_unified_adapter_rhel58_i386_dud_<version>.iso[3] brocade_unified_adapter_rhel59_i386_dud_<version>.iso[3] brocade_unified_adapter_rhel62_i386_dud_<version>.iso[3] brocade_unified_adapter_rhel63_i386_dud_<version>.iso[3] brocade_unified_adapter_rhel64_i386_dud_<version>.iso[3]	live_cd_<version>.iso	brocade_adapter_boot_fw_<version>
Linux RHEL and OL 5.9, 5.10, 6.4, and 6.5 (x86_64)	brocade_unified_adapter_rhel57_x86_64_dud_<version>.iso[3] brocade_unified_adapter_rhel58_x86_64_dud_<version>.iso[3] brocade_unified_adapter_rhel59_x86_64_dud_<version>.iso[3] brocade_unified_adapter_rhel62_x86_64_dud_<version>.iso[3] brocade_unified_adapter_rhel63_x86_64_dud_<version>.iso[3] brocade_unified_adapter_rhel64_x86_64_dud_<version>.iso[3]	live_cd_<version>.iso	brocade_adapter_boot_fw_<version>
Linux SLES 10.3, 10.4, 11.1, and 11.2 (x86, x86_64)	brocade_adapter_sles10sp3_dud_<version>.iso[2] brocade_adapter_sles10sp4_dud_<version>.iso[4] brocade_adapter_sles11sp1_dud_<version>.iso[4] brocade_adapter_sles11sp2_dud_<version>.iso[4]	live_cd_<version>.iso	brocade_adapter_boot_fw_<version>
VMware ESX/ESXi 5.0	bfa_esx50_<version>.iso[3] bna_esx50_<version>.iso[4]	live_cd_<version>.iso	brocade_adapter_boot_fw_<version>

Table 1-11. Boot installation packages (Continued)

Operating System (Platform)	Driver Update Disk Image	LiveCD	Boot Code
VMware ESX/ESXi 5.1	bfa_esx51_<version>.zip[5] bna_esx51_<version>.zip[6]	live_cd_<version>.iso	brocade_adapter_boot_fw_<version>
VMware ESX/ESXi 5.5	bfa_esx55_<version>.zip[5] bna_esx55_<version>.zip[6]	live_cd_<version>.iso	brocade_adapter_boot_fw_<version>

1. Unified drivers for boot over SAN and network (PXE) boot. Use unified DUD for RHEL 5.7 and above.
2. Drivers for host bus adapters, CNAs, and Fabric Adapter ports for boot over SAN.
3. Storage drivers for host bus adapters and Fabric Adapter ports configured in HBA mode. Note that you can use the VMware Image Builder PowerCLI to create an offline bundle and ISO ESXi 5.0 installation image that includes drivers and utilities. Refer to your Image Builder documentation for details on using Image Builder PowerCLI.
4. Network drivers for CNAs and Fabric Adapter ports configured in CNA or NIC mode. You can use the VMware Image Builder PowerCLI to create a brocade_esx50_<version>.zip offline bundle and brocade_esx50_<version>.iso ESXi 5.0 installation image that includes drivers and utilities. Refer to your Image Builder documentation for details on using Image Builder PowerCLI.

Downloading software and publications

To download all host bus adapter software and boot code, use the following steps.

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the link at the top of the page to direct you to the software package that you want.
4. Locate the software package for your adapter in the table, click on it, and then follow the directions.

Using BCU commands

Some procedures in this manual reference BCU commands for adapter monitoring and configuration.

To use BCU commands, enter commands at the BCU> command prompt. For Windows systems, installing the management utilities creates a QLogic BCU desktop shortcut on your system desktop. Select this to open a **Command Prompt** window in the folder where the BCU commands reside. You then run enter full BCU commands (such as **bcu adapter - -list**) or enter **bcu - -shell** to get a bcu> prompt where only the command (**adapter - -list**) is required.

Launching BCU on Windows systems through methods other than through the desktop shortcut is not recommended and may result in display of inconsistent information.

To list all the commands and subcommands, type the following command:

bcu - -help

To check the CLI and Driver version number, type the following command:

bcu - -version

To launch a BCU command at the BCU> prompt, enter the command as in the following example:

BCU> **port - -list**

NOTE

For complete details on BCU commands, refer to the *QLogic BR Series Adapter Administrator's Guide*.

VMware ESXi 5.0 and later systems

For VMware ESXi 5.0 and later systems, BCU commands are integrated with the esxcli infrastructure.

To run a BCU command, use the following syntax:

```
esxcli  brocade bcu --command=″command″
```

where:

command BCU command, such as **port - -list**.

For example:

```
esxcli  brocade bcu --command="port --list"
```

Items shipped with your adapter

This section describes items shipped with your adapter.

Stand-up adapters

The following items may be included with stand-up adapters for installation:

- Adapter with the following PCI mounting bracket installed, depending on your adapter model:
  - Low-profile PCI mounting bracket
  - Standard (full-height) PCI mounting bracket
- Additional bracket packaged with adapter, depending on your adapter model:
  - Standard (full-height) PCI mounting bracket
  - Low-profile PCI mounting bracket
- One SFP transceiver or two SFP transceivers, depending on your adapter model. Note that for CNAs and Fabric Adapters, SFP transceivers and copper cables may be purchased separately or shipped with the switch that supports Data Center Bridging (DCB).
- Adapter installation instructions
- Instructions for downloading software

Mezzanine adapters

The following items may be shipped with mezzanine adapters for installation, depending on the adapter model:

- Adapter
- Adapter installation instructions
- Important notices document and warranty card
- CD containing documentation for installing, removing, configuring, and troubleshooting the adapter.

2 Hardware Installation

Introduction

This chapter provides instructions for installing and replacing the following types of QLogic BR-Series Adapters:

- Stand-up host bus adapter, CNA. and Fabric Adapters.

  Instructions are also provided for removing and installing small form-factor pluggable (SFP) transceivers.

  NOTE

  Use only Brocade-branded SFP laser transceivers supplied for stand-up adapters.

- Host bus mezzanine adapter
- CNA mezzanine adapter
- Fabric mezzanine adapter

NOTE

When installing Fabric Adapters with ports configured in CNA or NIC mode and CNAs on VMware systems, it is advisable to install the driver before the adapter so that the NICs will be properly numbered in the system. Perform the appropriate steps in 3, “Software Installation” and then return to this chapter.

To troubleshoot problems after installation, refer to the *QLogic BR-Series Adapters Troubleshooting Guide*.

For details in items shipped with various adapter models for installation, refer to “Boot installation packages” on page 88.

ESD precautions

When handling the adapter, use correct electrostatic discharge (ESD) procedures:

- Be sure that you are properly grounded before beginning any installation.
- When possible, wear a wrist grounding strap connected to chassis ground (if system chassis is plugged in) or a bench ground.
- Store the adapter in antistatic packaging.

Stand-up adapters

Use information in this section to install stand-up adapter hardware on your host system.

What you need for installation

Have the following items available for installing the adapter hardware:

- Phillips #1 screwdriver.
- Adapter with appropriate mounting bracket attached.
- Appropriate cable with appropriate connectors to connect the adapter to the switch.
  - For Fabric Adapter cable and SFP transceiver specifications, refer to “Cabling (stand-up adapters)” on page 272.
  - For CNA cable and SFP transceiver specifications, refer to “Cabling (stand-up adapters)” on page 282.
  - For host bus adapter and Fabric Adapter port cable and SFP transceiver specifications, refer to “Cabling (stand-up adapters)” on page 292.
- Fully operational host.
- Access to a host from your user workstation either through LAN connection or direct attachment.

Installing an adapter

To install an adapter:

NOTE

The adapter can be damaged by static electricity. Before handling, use standard procedures to discharge static electricity, such as touching a metal surface and wearing a static ground strap. Handle the adapter by the edge and not the board components or gold connector contacts.

1. Check that you have received all items needed for installation. Refer to “Boot installation packages” on page 88.
2. Remove the adapter from its packaging and check for damage. If it appears to be damaged, or if any component is missing, contact QLogic or your reseller support representative.
3. Make a backup of your system data.
4. Power down the host. Unplug all power cords and network cables.
5. Remove all covers necessary from the system to access the PCIe slot where you want to install the adapter. Refer to documentation provided with your system to locate PCIe slots and cover removal procedures.
6. Remove the blank bracket panel from the system that covers the PCIe slot where you want to install the adapter. If the panel is secured with a screw, remove the screw and save it for securing the adapter’s bracket panel back in the slot.

   NOTE

   For best performance, install the adapter into a PCIe slot with an x8 lane or greater transfer interface. Also, do not install this adapter in a PCI slot. PCIe slots are shorter than PCI slots.

7. Remove all SFP transceivers from the adapter if clearances inside your system case prohibit you from installing the adapter with transceivers installed. Follow the instructions under “Removing and installing SFP transceivers” on page 100. Otherwise go on to the next step.

8. Use the following steps to change brackets if the installed bracket does not fit your system enclosure. If the installed low-profile bracket works, go on to Step 9.

NOTE

The adapter ships with one bracket installed and another size bracket in the shipping container.

a. Remove all SFP transceivers from the adapter. Refer to “Removing and installing SFP transceivers” on page 100 for procedures.

b. Remove the two screws attaching the bracket to the adapter, and pull off the bracket. Refer to Figure 2-1.

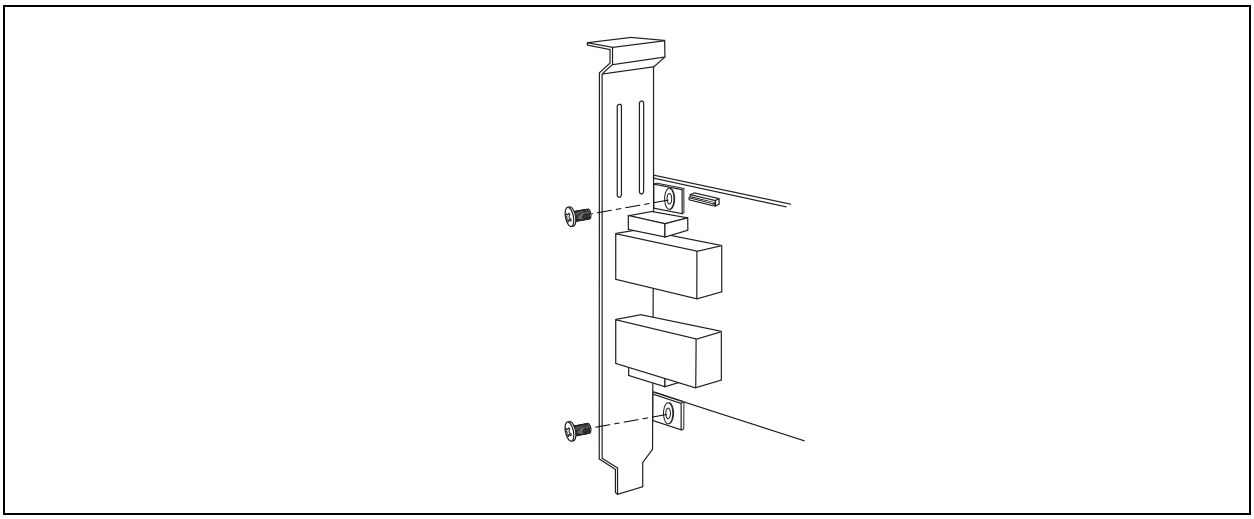


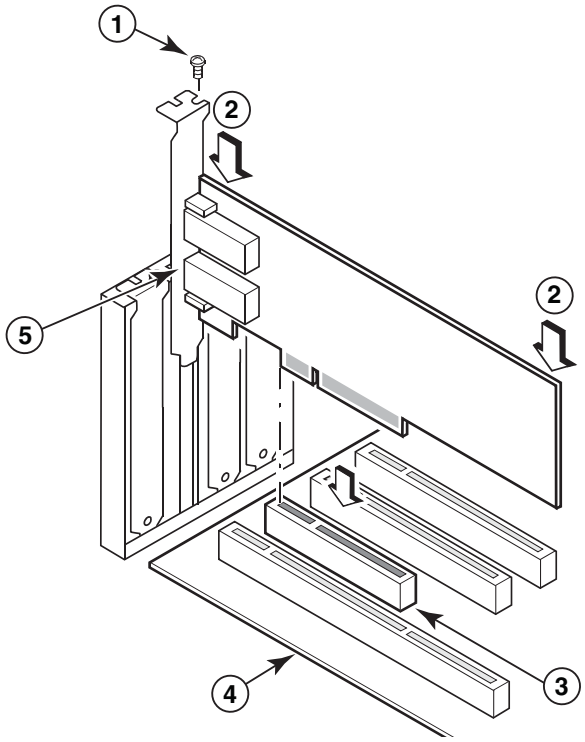
Figure 2-1. Removing or installing adapter mounting bracket

c. Carefully guide the new mounting bracket onto the adapter, making sure the bracket mounting tabs align with the holes in the adapter.

d. Replace and tighten the two screws.

e. Store the mounting bracket that you removed for future use.

9. Insert the adapter into the desired empty PCIe bus slot. Press firmly until the adapter seats. Refer to Figure 2-2 for seating directions.



1 Mounting screw

2 Top edge of adapter (press down into slot)

3 PCI X8 slot

4 Edge of host board

5 SFP transceivers

Figure 2-2. Installing adapter in system chassis

10. Secure the adapter's mounting bracket to the case using the method required for your case. Note that in some systems, the bracket may secure to the case with a screw.

11. If you removed transceivers in Step 7, make sure to install adapter receivers. Refer to "Removing and installing SFP transceivers" on page 100 for procedures.

12. Replace the system's case or cover and tighten all screws.

Connecting an adapter to switch or direct-attached storage

Use multimode fiber-optic cable or twinaxial copper cable (CNAs or Fabric Adapters ports configured in CNA or NIC mode) with appropriate connectors when connecting the adapter to the switch. Use multimode fiber-optic cable when connecting an host bus adapter or Fabric Adapter port configured in HBA mode to a switch or direct-attached storage. Refer to “Cabling (stand-up adapters)” on page 282 for cable specifications.

1. Pull out the protective rubber inserts from fiber-optic SFP transceiver connectors, if installed in adapters or the switch.
2. Connect the cable from the switch to the appropriate SFP transceiver connector on the adapter.

Removing and installing SFP transceivers

Use the following procedures to remove and install fiber-optic SFP transceivers.

NOTE

Use only the Brocade-branded small form-factor pluggable (SFP) transceivers in the QLogic BR-Series Adapters. Refer to “Hardware compatibility” on page 15.

Removing transceivers

If you need to remove SFP transceivers from the adapter to provide clearance for installing into the server cabinet, use the following steps.

1. Pull out the protective rubber plug from the SFP transceiver connector.
2. Remove the SFP transceiver.
   - For SFP transceivers with optical transceivers, use your thumb and forefinger to unlatch the bail from the side of the cable connector. Using the bail or pull tab as a handle, pull the SFP transceiver straight out of the receiver. Refer to the left illustration in Figure 2-3.

     NOTE

     For 16 Gbps optical transceivers, a pull tab may be available for pulling the SFP transceiver out of the receiver.

   - For copper SFP transceivers with attached cables, use your thumb and forefinger to pull the tab on the cable to release the SFP transceiver latch, and then pull the SFP transceiver straight out of the receiver. Refer to the right illustration in Figure 2-3.

NOTE

In the following figure, the fiber-optic SFP transceivers are shown in illustration A, and the copper SFP transceivers with attached cable are shown in illustration B.

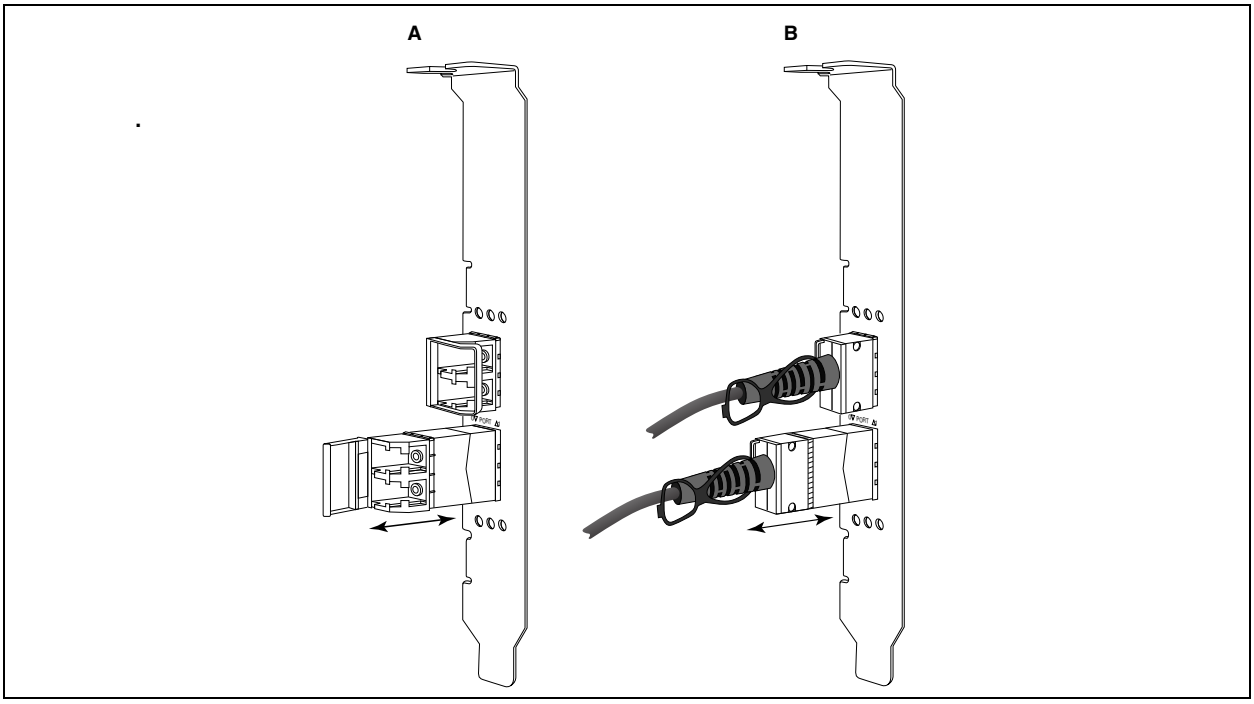


Figure 2-3. Removing or installing fiber-optic and copper SFP transceivers

Installing transceivers

1. Orient the SFP transceiver in front of its slot on the adapter so that it can slide into the adapter receiver slot. The SFP transceiver can only be oriented one way into the slot.
2. Carefully guide the SFP transceiver into the adapter's receiver until it seats.
   - For optical SFP transceivers, close the bail to latch the SFP transceiver into the receiver.
   - For copper SFP transceivers, push the SFP transceiver into the receiver until it clicks into place.

Replacing an adapter

If you are replacing an adapter, perform the following steps.

1. Make a backup of your system data.
2. Power down the host. Unplug all power cords and network cables.
3. Remove all covers necessary from the system to access the PCIe slot where you want to install the adapter. Refer to documentation provided with your system to locate PCIe slots and cover removal procedures.
4. Unlatch the mounting bracket for the installed adapter or remove the screw (if applicable) securing it to the case.
5. Pull the adapter gently from PCIe connectors.
6. Install the new adapter following the appropriate steps for your adapter under “Stand-up adapters” on page 96.

All configuration settings for the old adapter in the slot will automatically apply to the new adapter.

Mezzanine adapters

Mezzanine adapters are smaller modules than stand-up models that mount on server blades that install in blade system enclosures. Instead of connecting fiber-optic cables between stand-up adapters ports in traditional servers and switches, mezzanine adapters connect to switch or I/O modules installed in the blade system enclosure through the enclosure midplane.

Use information in this section as a guideline to install these adapters in compatible blade servers from supported manufacturers.

BR-804 host bus adapter

To install the BR-804 mezzanine host bus adapter into the server blade, refer to the installation instructions shipped with the adapter.

Also refer to the setup and installation guide and user guide for the blade system enclosure for the following information:

- Instructions for removing and installing the server blade in the enclosure.
- Details about the association between the mezzanine bay and interconnect bays in the blade system enclosure. The location where you install the mezzanine adapter determines where you install the interconnect modules.
- Instructions for accessing the server blade through a console or workstation to install adapter drivers and software.

For details on other devices that install in the blade system enclosure, refer to the *installation and user guides* that came with the device.

For details on compatibility with blade servers, switch modules, I/O modules, and other devices that install in the blade system enclosure, refer to “Server blades and system enclosures (mezzanine adapters)” on page 16.

What you need for installation

Have the following available before installing the adapter:

- Mezzanine card shipping carton, which includes the mezzanine card and necessary documentation.
- Fully operational blade server.
- Access to a blade server through a local or remote console connection for installing adapter drivers and software.
- Blade server installation and user guides.
- Blade system enclosure installation and user guides.
- Interconnect and switch module installation guides for the blade system enclosure.

NOTE

“Verifying adapter installation” on page 177 provides a list of general items to verify during and after installing hardware and software to avoid possible problems. You can use the list to verify proper installation and make corrections as necessary.

BR-1867 and BR-1869 host bus adapters

For details on installing the BR-1867 or BR-1869 mezzanine host bus adapter in an IBM Flex System compute node, refer to the IBM Flex System Installation and Service Guide provided for the compute node.

For references to compatibility information for adapters, compute nodes, switch modules, and other devices that install in the blade system chassis, refer to “Server blades and system enclosures (mezzanine adapters)” on page 16.

What you need for installation

Have the following available for installing the adapter:

- Adapter shipping carton, which includes the adapter and necessary documentation.
- Fully operational blade server.
- Access to a blade server through a local or remote console connection.

- Blade server or storage expansion unit installation and user guides.
- Blade system enclosure installation and user guides.

NOTE

"Verifying adapter installation" on page 177 provides a list of general items to verify during and after installing hardware and software to avoid possible problems. You can use the list to verify proper installation and make corrections as necessary.

BR-1007 CNA

For details on installing the BR-1007 mezzanine CNA in a blade server, refer to the *installation and user guides* that ship with the blade server and blade system enclosure.

To support each I/O module that you install in the blade system enclosure, you may also need to install a compatible CNA in each blade server that you want to communicate with the I/O module. Refer to the documentation for your blade system enclosure for details.

For references to compatibility information on blade servers, switch modules, I/O modules, and other devices that install in the blade system enclosure, refer to "Server blades and system enclosures (mezzanine adapters)" on page 16.

What you need for installation

Have the following available for installing the adapter:

- Adapter shipping carton, which includes the adapter and necessary documentation.
- Fully operational blade server.
- Access to a blade server through a local or remote console connection.
- Blade server or storage expansion unit installation and user guides.
- Blade system enclosure installation and user guides.
- I/O module installation guide for the blade system enclosure.

NOTE

"Verifying adapter installation" on page 177 provides a list of general items to verify during and after installing hardware and software to avoid possible problems. You can use the list to verify proper installation and make corrections as necessary.

BR-1741 CNA

For details on installing the BR-1741 mezzanine CNA on a blade server, refer to the Dell™ PowerEdge M1000e modular blade system hardware owner's manual. Refer to that manual for the following information:

- Full details on installing and removing blades from the blade enclosure and installing and removing mezzanine cards from blades.
- Guidelines for installing mezzanine cards. Before installing the mezzanine card, review the installation guidelines, especially to identify *blade slots for installing mezzanine cards and enclosure bays for installing supported I/O modules*.
- Guidelines for installing I/O modules. To support each I/O module that you install in the blade enclosure, you may also need to install a compatible mezzanine card in each blade server that you want to communicate with the I/O module.
- Instructions for accessing the blade server through a console or workstation to install adapter drivers and software.

What you need for installation

Have the following available for installing the adapter:

- Mezzanine card shipping carton, which includes the adapter and necessary documentation.
- Fully operational blade server.
- Access to the blade server through local or remote console connection.
- The blade enclosure's *hardware owner's manual.*

Updating PHY firmware

The Ethernet PHY module, located in the BR-1741 mezzanine CNA port hardware only, aids in communications to and from the Ethernet LAN. Instructions are provided in this section to update this firmware if required.

Determining firmware version

To query the PHY module and determine attributes, such as the PHY module status and installed firmware version, use the **bcu phy --query** command.

```
bcu phy --query <port_id>
```

where:

`<port_id>` is the ID of the port for which you want to determine the firmware version. This could be the PWWN, port hardware path, or user-specified port name. This could also be the adapter-index/port-index. For example, to specify adapter 1, port 1, you would use 1/1 as the port identification.

Updating firmware

Download the latest PHY firmware file and update the PHY using the **bcu phy --update** command.

```
bcu phy --update <ad_id> | -a <image_file>
```

where:

`-a`, if specified, means that the update will apply to all adapters in the system that contain the PHY module.

`ad_id` is the ID of the adapter.

`file_name` is the name of the binary firmware file.

NOTE

After updating the firmware, you must disable and then enable the adapter to activate it.

3 Software Installation

Introduction

This chapter provides procedures to install adapter drivers, HCM, and other software using the following options:

- “Using the QLogic Adapter Software Installer” on page 113.
- “Using software installation scripts and system tools” on page 138.

Procedures are also provided for removing software using the QLogic Adapter Software Uninstaller (refer to “Software removal using Adapter Software Uninstaller” on page 130), and upgrading software using the QLogic Adapter Software Installer (refer to “Software upgrade using the QLogic Adapter Software Installer” on page 135). Procedures are also provided for configuring HCM agent operations, and setting the IP address and subnet mask on CNAs and Fabric Adapter ports configured in CNA or NIC mode.

NOTE

This manual does not provide instructions for installing the CIM Provider. Please refer to the *CIM Provider for QLogic BR-Series Adapters Installation Guide.*

To troubleshoot problems after installation, refer to the *QLogic BR-Series Adapters Troubleshooting Guide*.

To keep adapter drivers and boot code synchronized, be sure to update your adapter with the latest boot image whenever you install or update adapter driver packages. Use the following steps:

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the **Boot Code** link at the top of the page to direct you to the boot code packages.

4. Locate the boot code package for your adapter in the table, click on it, and then follow the directions.

Refer to “Boot code updates” on page 189 for instructions to install the image.

Installation notes

This section contains general notes and specific notes for host system operating systems that you should consider before installing adapter software:

General

Following are general notes you should be aware of when installing adapter software:

- For details on operating system requirements for installing adapter drivers, refer to “Host operating system support” on page 70 and “Software installation and driver packages” on page 81. Also download the latest release notes from the QLogic Web Site using the following steps:
  1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
  2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
  3. Click the **Driver** link at the top of the page to direct you to the driver packages.
  4. Locate the driver for your adapter in the table, and then click on the release notes link.
- Find the installer program for your host’s operating system and platform under “Software installation and driver packages” on page 81. Following are generic names for the Installer program for supported operating systems.
  - Windows systems

    ```
    brocade_adapter_software_installer_windows_<version>.exe
    ```

  - Linux systems

    ```
    brocade_adapter_software_installer_linux_<version>.bin
    ```

  - Solaris systems

    ```
    brocade_adapter_software_installer_Solaris_<platform>_<version>.bin
    ```

NOTE

The <platform> variable in the installer commands is the host system architecture, such as SPARC, x86, or x64.

- You must use the QLogic Adapter Software Installer application to install HCM to the host system where the adapter is installed or to a separate remote management platform.You cannot install HCM using the QLogic-provided installation scripts or your system's "native" installation commands. After installation, an HCM desktop shortcut is available on Windows Linux, and Solaris systems.
- Software installation or upgrade could take much longer than normal under the following conditions:
  - On a host system with a large number of adapters.
  - On a host system where large number of LUNs are exposed through different paths to the multi path software.
- If you receive errors when launching the GUI-based QLogic Adapter Software Installer, such as InvocationTargetException errors, your system may not be able to run a GUI-based application. Instead use the instructions under "Software installation using Software Installer commands" on page 120.
- Installing software with the QLogic Adapter Software Installer automatically starts the HCM Agent. You can manually start and stop the agent using the instructions under "HCM Agent operations" on page 183.
- When downgrading HCM using QASI, refer to "Using software installation scripts and system tools" on page 138.
- When using the QLogic Adapter Software Installer to install HCM, a "Found Backed up data" message displays if a backup directory exists for previously installed software. This message prompts you to restore or not to restore old configuration data. Refer to "HCM configuration data" on page 186 for more information.
- Only one driver installation is required for all QLogic BR-Series Adapters (host bus adapters, CNAs, or Fabric Adapters) installed in a host system.
- Root or administrator privileges are required for installing the driver package.
- The procedures in this section assume that the host's operating system has been installed and is functioning normally.

Linux

Following are notes that you should be aware of when installing adapter software on Linux systems:

- After installing drivers on a Linux system, you must reboot the system to enable the drivers.
- Starting with SLES 11 SP2, the Brocade KMP packages are digitally signed by Novell with a “PLDP Signing Key.” If your system doesn't have the public PLDP key installed, RPM installation will generate a warning similar to the following:

  “warning: brocade-bna-kmp-default-3.0.3.3_3.0.13_0.27-0.x86_64.rpm: Header V3 RSA/SHA256 signature: NOKEY, key ID c2bea7e6”

  To ensure authenticity and integrity of the driver package, we recommend that you install the public PLDP key (if not already installed) before installing driver package. The PLDP key and installation instructions can be found at http://drivers.suse.com/doc/pldp-signing-key.html.
- On Linux SLES 10 and 11 systems, when installing the source-based (noarch) driver packages (brocade_driver_linux_<version>.tar.gz) or when using the QLogic Adapter Software Installer and the kernel has been upgraded to a version without precompiled binaries, perform the following tasks to make sure the drivers will load on system reboot. We strongly recommend a reboot after these steps to avoid any issues.

  For Linux SLES 10 systems, perform the following steps:

  1. Make sure the “load_ unsupported_modules_automatically” variable is set to “yes” in /etc/sysconfig/hardware/config.
  2. Run the **mkinitrd** command to load automatically during system boot.

  For Linux SLES 11 systems, perform the following steps:

  1. Make sure the “allow_unsupported_modules” value is set to 1 in /etc/modprobe.d/unsupported-modules.
  2. Run the **mkinitrd** command to load automatically during system boot.
- By default, the initrd file will be backed up automatically during Linux installations. During installation, a dialog box displays with the location of the file. If a file exists, a dialog box displays with its current location and allows you to overwrite the file, not overwrite the file, or quit.

- After installing the adapter driver and software on an SLES11 SP1 system, use one of the following methods if updating the errata kernel:
  - Upgrade the kernel using the **rpm -ivh** *filename* command.
  - Upgrade the kernel using the **rpm -Uvh** command or YaST with these steps:
    a. Upgrade the kernel using **rpm -Uvh** or YaST.
    b. Use the QLogic Adapter Software Installer (QASI) to install the driver.
    c. Ensure the boot order in /boot/grub/menu.lst is set to boot from the newly installed kernel.
    d. Reboot the server.

Solaris

Following are notes that you should be aware of when installing adapter software on Solaris systems:

- BR-804 and BR-1007 adapters are not supported on Solaris systems so Solaris commands in this section do not apply.
- After installing drivers on a Solaris system, you must reboot the system to enable the drivers.

Windows

Following are notes that you should be aware of when installing adapter software on Windows systems:

- For Windows systems, installing the management utilities creates a QLogic BCU desktop shortcut on your system desktop. Select this to open a **Command Prompt** window in the folder where the BCU commands reside. You can then run enter full BCU commands (such as **bcu adapter - -list**) or enter **bcu - -shell** to get a bcu> prompt where only the command (**adapter - -list**) is required.
- Before installing the driver on Windows systems, install the following hot fixes from the Microsoft “Help and Support” website, and then reboot the system:
  - Windows 2008 R2

    KB977977 is recommended for CNAs and Fabric Adapter ports configured in CNA mode.

KB2490742 is recommended when installing storage drivers to avoid a “Ox000000B8” stop error when shutting down or hibernating a system running Windows 7 or Windows Server 2008 R2.

Note that you can change the default communication port (34568) for the agent using the procedures under “HCM Agent operations” on page 183.

VMware

Following are notes that you should be aware of when installing adapter software on VMware systems:

- The QLogic Adapter Software Installer is not supported on the VMware ESX platforms for installing drivers, HCM, or utilities. However, you can use an appropriate QLogic Adapter Software Installer to install HCM on a “guest” system. For VMware, drivers and utilities are provided as ISO images packed in a tarball file. A QLogic installer script is available for installation.
- There are firewall issues with the HCM Agent and Common Information Model (CIM) Provider on VMware systems. When installing the driver package on these systems, open the following TCP/IP ports from a “guest” system the server to allow communication between the server and agent:
  - For HCM, open port 34568.
  - For CIM Provider, open port 5989.

  Following is an example for opening port 34568:

  ```
  /usr/sbin/esxcfg-firewall-o 34568,tcp,in,https
  /usr/sbin/esxcfg-firewall-o 34568,udp,in,https
  ```

  Note that you can change the default communication port for the HCM Agent using the procedures under “HCM Agent operations” on page 183.
- Because some versions of ESX and ESXi do not enforce maintenance mode during driver installation, it is recommended that you put the host in maintenance mode, as a system reboot is required after installation.

Using the QLogic Adapter Software Installer

Use information in this section to install the Host Connectivity Manager (HCM) and driver packages for your host platform using the QLogic Adapter Software Installer (QASI) application. Instructions for using the GUI-based installer and command line installer are provided. The QLogic Adapter Software Installer application allows you to install all software or to selectively install the HCM or driver packages or management utilities.

NOTE

The QLogic Adapter Software Installer is available for Windows, Linux, and Solaris operating systems. For VMware systems, it will only operate on “guest” operating systems for installing the HCM application. To install the driver and utilities package for VMware systems, refer to “Driver installation and removal on VMware systems” on page 157.

For instructions on using the QLogic installation scripts and installation commands that are “native” to your host operating system, refer to “Using software installation scripts and system tools” on page 138.

For details on HCM, driver packages, and other adapter software components for each supported host system, refer to “Adapter software” on page 75.

Two installation options are available when using the QLogic Adapter Software Installer:

- Installation using a GUI-based installer. Refer to “Using the GUI-based installer” on page 114.
- Installation using commands. This method completely installs the driver package, HCM, or all components without user interaction. Refer to “Software installation using Software Installer commands” on page 120.

NOTE

The storage driver will claim all installed QLogic BR-Series Adapter ports configured in HBA or CNA mode installed in a host system.

Using the GUI-based installer

The QLogic Adapter Software Installer (QASI) GUI-based application or commands are the preferred methods to install the following components on your host system:

- Storage and network drivers.
- Management Utilities, including the HCM agent, BCU, installation scripts, and SNMP agent files.
- HCM only.

This application operates on systems specified under Table 1-10 on page 83. To use the command-line version of this application, refer to "Software installation using Software Installer commands" on page 120.

The Adapter Software Installer installs HCM, all driver packages, and management utilities based on your host operating system. The HCM Agent starts automatically after installation. You can also install software components using software installer scripts and "native" system commands (refer to "Using software installation scripts and system tools" on page 138).

NOTE

The QLogic Adapter Software Installer (QASI) is not supported on VMware ESX platforms. However, you can use the appropriate QLogic Adapter Software Installer to install HCM to a guest system (Windows, Linux, or Solaris). To install adapter drivers on VMware systems, refer to "Using software installation scripts and system tools" on page 138.

Use the following steps to install all software required for QLogic BR-Series Adapters with the GUI-based installer program.

NOTE

It is strongly recommended that you shut down the HCM application if it is running on your system.

To download the Adapter Software Installer:

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the **Software Installers** link at the top of the page to direct you to the adapter software installer packages.

4. Locate the adapter software installer package for your adapter in the table, click on it, and then follow the directions.
5. Execute the appropriate Adapter Software Installer program (.exe or .bin file), depending on your host's operating system and platform.

   A progress bar displays as files are extracted (Figure 3-1).

Figure 3-1. Installer progress bar

When all files are extracted, a **QLogic Adapter Software** title window appears.

6. When the QLogic Software Installer Introduction screen displays (Figure 3-2), read the recommendations and instructions, and then click **Next**.

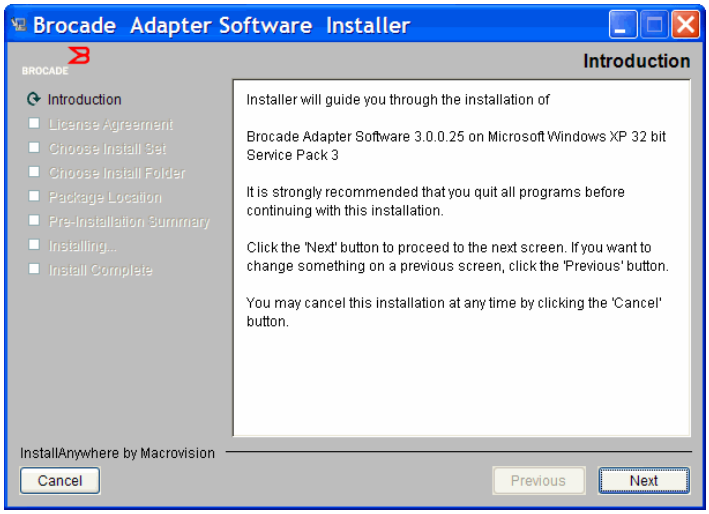

Brocade Adapter Software Installer
Introduction
Introduction
License Agreement
Choose Install Set
Choose Install Folder
Package Location
Pre-Installation Summary
Installing...
Install Complete
Installer will guide you through the installation of
Brocade Adapter Software 3.0.0.25 on Microsoft Windows XP 32 bit Service Pack 3
It is strongly recommended that you quit all programs before continuing with this installation.
Click the 'Next' button to proceed to the next screen. If you want to change something on a previous screen, click the 'Previous' button.
You may cancel this installation at any time by clicking the 'Cancel' button.
InstallAnywhere by Macrovision
Cancel
Previous
Next

Figure 3-2. QLogic Adapter Installer Introduction screen

NOTE

The adapter software version in the preceding screen will vary according to the version you are installing.

7. When the **License Agreement** screen displays, select **I accept the terms of the License Agreement**, and then click **Next** to continue.
8. If a backup directory exists for previously installed software, a “Found Backed up data” message displays prompting you to restore old configurations. Select either to restore or not to restore and continue installation. Refer to “HCM configuration data” on page 186 for more information. If this message does not display, go on to Step 9.
9. If a screen such as the one in Figure 3-3 on page 116 displays listing software components already installed on your system, select one of the following options, click Continue, and then skip to Step 13.
   - **Install with existing configuration**. The installer compares each configured property and keeps the original value if different than the default value.
   - **Install with default configuration**. The installer upgrades the software and loads with default configurations.

NOTE

Existing versions of the adapter’s software components will be overwritten with the current versions you are installing if you continue.

If this window does not display, go on to Step 10.

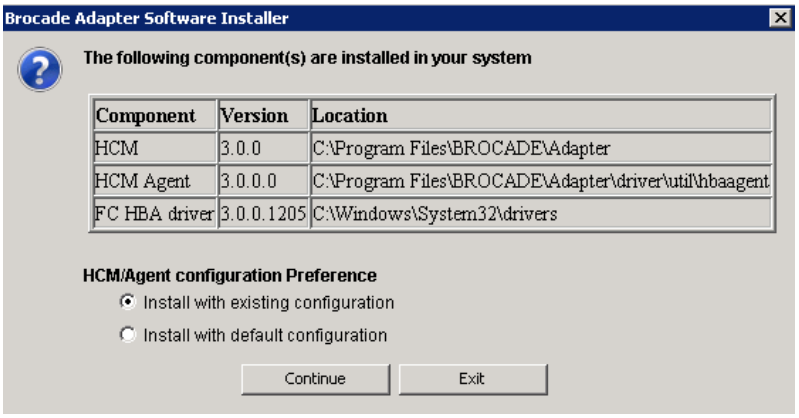


Figure 3-3. Existing software components installed screen

NOTE

The versions of software components displayed in the preceding screen will vary according to the adapter software version that is currently installed.

10. If a message box displays prompting you to close all HCM applications, close all applications if they are still running, and then click **OK**.

    The **Choose Install Set** screen displays (Figure 3-4).

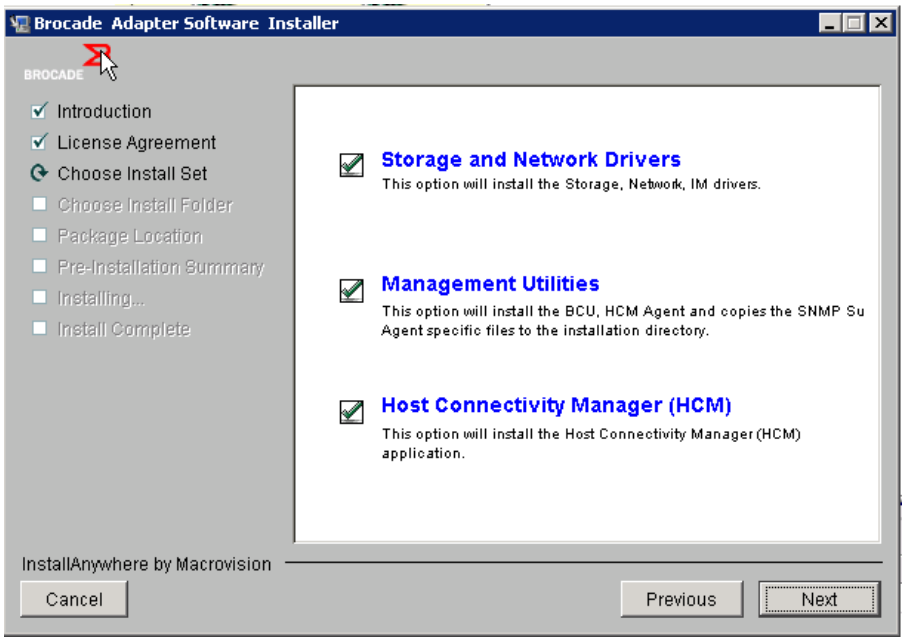


Figure 3-4. Choose Install Set screen

11. Select which software you want to install, and then select **Next**.

    If you are installing the management utilities and warnings display that the HCM Agent requires storage and network driver installation or does not match the current driver installation, click **OK**. and select the **Management Utilities** and **Storage and Network Drivers** options.

12. If the **Choose Install Folder** screen displays, prompting you to choose a destination folder for the software, select one of the following options. If this screen does not display, proceed to Step 13.
    - Enter a location for installing the software where the default installation folder displays.
    - Select **Choose** to browse to a location on your file system.
    - Select **Restore Default Folder** to enter the default installation folder.
13. When the **Package Location Information** screen displays listing the installed software components and their locations on your system, select **Next to continue.**
14. When the **Pre-Installation Summary** screen displays (Figure 3-5), review the information and select **Install** to confirm and begin the installation.

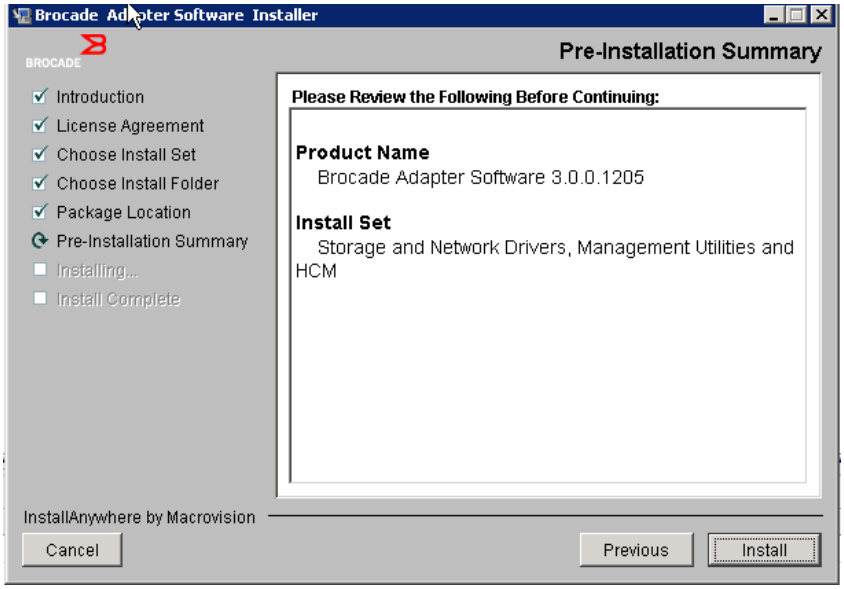


Figure 3-5. Preinstallation Summary screen

NOTE

The adapter software version displayed in the preceding screen will vary according to the version you are installing.

A progress bar displays showing installation progress for the various software components.

NOTE

For Windows systems, a **Force Driver Installation** message box displays if a better driver is already installed for the adapter. If message displays, **select OK to overwrite the existing driver or Cancel to quit installation.**

After software installs, the **Install Complete** screen displays listing installed drivers and other components (Figure 3-6).

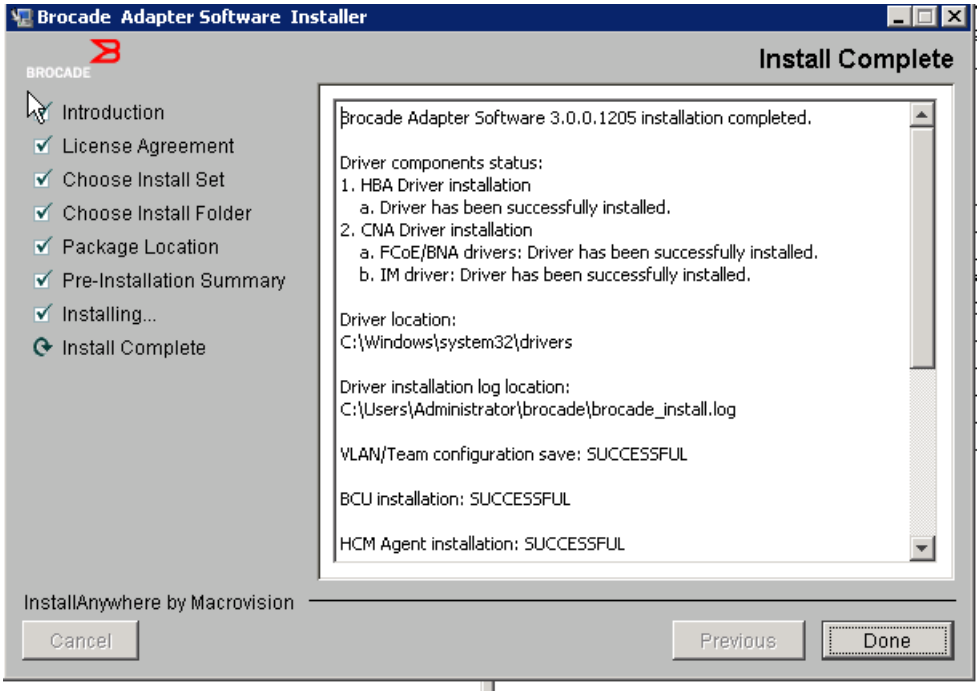


Figure 3-6. Install Complete screen

NOTE

The adapter software version displayed in the preceding screen will vary according to the version you are installing.

15. Confirm that all software installed successfully. If the screen instructs you to restart or reboot the system, select any options that apply.
16. Select **Done**.
17. Verify installation using tools available on your host system. Refer to “Confirming driver package installation” on page 171 for details.

18. To make sure that the drivers and adapter boot code are synchronized, be sure to update your adapter with the latest boot image from the QLogic Web Site at http://driverdownloads.qlogic.com whenever you install or update adapter driver packages. Refer to “Boot code updates” on page 189 for instructions to install the boot image.

NOTE

Installing adapter software creates a QLogic BCU CLI desktop shortcut on your system desktop. Use this shortcut instead of other methods to launch the BCU> command prompt and enter BCU commands. Select this to open a **Command Prompt** window in the folder where the BCU commands reside. You can also enter full BCU commands (such as **bcu adapter - -list**) or enter **bcu - -shell** to get a bcu> prompt where only the command (**adapter - -list**) is required.

Software installation using Software Installer commands

Execute QLogic Adapter Software Installer commands detailed in this section on the host system’s command line with your choice of parameters to step through the installation or automatically install network and storage driver packages, the HCM application, or both without requiring further user interaction. The HCM Agent starts automatically after installation.

For details on operating system requirements for installing adapter drivers, refer to “Host operating system support” on page 70 and “Software installation and driver packages” on page 81. Also download the latest release notes from the QLogic Web Site whenever you install or update adapter driver packages, using the following steps:

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the **Drivers** link at the top of the page to direct you to the driver packages.
4. Locate the driver package for your adapter in the table, and then click on the release notes link.

Note that on systems without a configured GUI, using the installer command without parameters as outlined in “Using the GUI-based installer” on page 114 may generate errors and the installer program will fail. Using the installer command with parameters outlined in this section will allow you to install all or individual adapter software components.

Following are the commands you can use for supported operating systems:

- Windows systems - possible commands
  - Install drivers, HCM GUI, or both. Overwrites the existing driver installed on the system.

    ```
    brocade_adapter_software_installer_windows_<version>.exe
    ```

  - Install drivers and HCM GUI in silent mode (no interaction required).

    ```
    brocade_adapter_software_installer_windows_<version>.exe
    -i silent
    ```

  - Install drivers and the HCM GUI using a default installation properties file.

    ```
    brocade_adapter_software_installer_windows_<version>.exe
    -f  HCMDefaultInstall.properties
    ```

  - Install software in silent mode using default installation properties file. Note that this is recommended for silent mode.

    ```
    brocade_adapter_software_installer_windows_<version>.exe
    -i silent -f  HCMDefaultInstall.properties
    ```

- Linux systems - possible commands
  - x_86 and x_86_64 platforms

    Install drivers, HCM GUI, or both. Overwrites the existing driver installed on system.

    ```
    sh brocade_adapter_software_installer_linux_<version>.bin
    ```

    Install drivers and HCM GUI in silent mode (no interaction required).

    ```
    sh brocade_adapter_software_installer_linux_<version>.exe
    -i silent
    ```

    Install drivers and the HCM GUI using a default installation properties file.

    ```
    sh brocade_adapter_software_installer_linux_<version>.bin
    -f  HCMDefaultInstall.properties
    ```

Install software in silent mode using default installation properties file. Note that this is recommended for silent mode.

```
sh brocade_adapter_software_installer_linux_<version>.bin
-i silent -f  HCMDefaultInstall.properties
```

Install noarch driver in silent mode when kernel-specific driver is not available and select to install HCM GUI, or both.

```
sh brocade_adapter_software_installer_linux_<version>.bin
-DCHOSEN_INSTALL_SET=[DRIVER|GUI|BOTH]
-DCONT_NOARCH_DRIVER=[NO|YES] -i silent
```

Install drivers, HCM GUI, or both. Overwrites the backed-up initrd file.

```
sh brocade_adapter_software_installer_linux_<version>.bin
-DCHOSEN_INSTALL_SET=[DRIVER|GUI|BOTH]
-DFORCE_INITRD_BACKUP=[NO|YES] -i silent
```

- Solaris systems
  - x_86 platforms

    Install drivers, HCM GUI, or both. Overwrites the existing driver installed on system.

    ```
    sh
    brocade_adapter_software_installer_solaris_x86_<version>.
    bin
    ```

    Install drivers and HCM GUI in silent mode (no interaction required).

    ```
    sh
    brocade_adapter_software_installer_solaris_x86_<version>.
    bin -i silent
    ```

    Install software in silent mode using default installation properties file. Note that this is recommended for silent mode.

    ```
    sh
    brocade_adapter_software_installer_solaris_x86_<version>.
    bin -i silent -f  HCMDefaultInstall.properties
    ```

Install software in silent mode using default installation properties file. Note that this is recommended for silent mode.

```
sh
brocade_adapter_software_installer_solaris_x86_<version>.
bin -i silent -f  HCMDefaultInstall.properties
```

```
Install driver, HCM GUI, or both in silent mode.
Overwrites the existing driver installed on the system.
```

```
sh
brocade_adapter_software_installer_solaris_x86_<version>.
bin -DCHOSEN_INSTALL_SET=[DRIVER|GUI|BOTH] -i silent
```

- SPARC platforms

```
Install driver, HCM GUI, or both. Overwrites the existing
driver installed on the system.
```

```
sh
brocade_adapter_software_installer_solaris_sparc_<version
>.bin
```

Installs drivers and HCM GUI in silent mode (no interaction required).

```
sh
brocade_adapter_software_installer_solaris_sparc_<version
>.bin -i silent
```

Install drivers and the HCM GUI using a default installation properties file.

```
sh
brocade_adapter_software_installer_solaris_sparc_<version
>.bin -f  HCMDefaultInstall.properties
```

Install software in silent mode using default installation properties file. Note that this is recommended for silent mode.

```
sh
brocade_adapter_software_installer_solaris_sparc_<version
>.bin -i silent -f  HCMDefaultInstall.properties
```

Command options

Following are the options that you can modify and include in command strings. You can also edit these fields in the properties file to change the default install set:

- INSTALLER_UI=silent

  Specifies that the installation mode should be silent.

- CHOSEN_INSTALL_SET=BOTH

  Specifies to install either the network and storage driver packages, the GUI (HCM), or all components.:

  - BOTH - This parameter installs both the GUI and the driver. The HCM Agent starts automatically after installation.
  - DRIVER - This parameter installs only the driver. The HCM Agent starts automatically after installation.
  - GUI - This parameter installs only HCM.

- CONT_NOARCH_DRIVER=[NO|YES]

  Use for installing non-specific architecture drivers when kernel-specific driver is not available. If set to YES, installs the noarch driver on Linux systems. NO is the default value if you do not specify the parameter as an argument.

- FORCE_WIN_DRIVER_INSTALLATION=1

  Be sure to uncomment the "FORCE_WIN_DRIVER_INSTALLATION=1" to overwrite the existing driver on Windows platform. Note that this may require system reboot.

  For Linux or Solaris systems, use the standard DCHOSEN_INSTALL_SET command to overwrite existing software.

- #FORCE_INITRD_BACKUP=YES

  For Linux systems, a “YES” value overwrites the backed-up initrd file.

All parameters are case-sensitive and make sure to spell the parameters correctly.

Complete details on editing and executing the properties file are available under the “Guidelines for silent installation” section located in the HCMDefaultproperties.file.

Important notes

Review these notes before using QLogic Adapter Software Installer (QASI) commands.

General notes

The following notes pertain to all operating systems. For notes pertaining to specific operating systems, refer to “Windows systems” on page 127, “Linux systems” on page 127, and “VMware systems” on page 127.

- Executing the following commands without parameters will launch the GUI-based installer described under “Using the GUI-based installer” on page 114.
  - Windows systems

    ```
    brocade_adapter_software_installer_windows_<version>.exe
    ```

  - Linux systems

    ```
    sh brocade_adapter_software_installer_linux_<version>.bin
    ```

  - Solaris systems

    ```
    sh
    brocade_adapter_software_installer_solaris_<x86_<version>
    .bin


    sh
    brocade_adapter_software_installer_solaris_sparc_<version
    >.bin
    ```

- Complete details on editing and executing the properties file are available under the “Guidelines for silent installation” section located in the HCMDefaultproperties.file.
- If you choose to install the driver, both the storage and network drivers will be installed.
- Software installation or upgrade on a host system with a large number of adapters could take much longer than normal.
- Parameters are case-sensitive.
- Find the installer program for your server’s operating system and platform under “Software installation and driver packages” on page 81. Before using any commands described in this section, use the following steps to download the Adapter Software Installer to your system.

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the **Software Installers** link at the top of the page to direct you to the adapter software installer packages.
4. Locate the adapter software installer package for your adapter in the table, click on it, and then follow the directions.

- To enter these commands, first change to the directory where the adapter software is installed (cd <install directory>). Default install directories are the following;
  - Windows systems

    C:\Program Files\BROCADE\Adapter
  - Linux and Solaris systems

    /opt/brocade/adapter
- To launch the installer in silent mode, you must use and provide values for the following parameters:
  - DCHOSEN_INSTALL_SET
  - -i silent
- To make sure that the drivers and adapter boot code are synchronized, be sure to update your adapter with the latest boot image from after you install or update adapter driver packages. using the following steps.

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the **Boot Code** link at the top of the page to direct you to the boot code packages.
4. Locate the boot code package for your adapter in the table, click on it, and then follow the directions.
5. Refer to “Boot code updates” on page 189 for instructions to install the boot code image.

Windows systems

The following installation notes pertain to Windows systems only:

- On Windows XP, Vista and NT, 2000, and Server 2003, only the GUI will install for all DCHOSEN_INSTALL_SET values (DRIVER, GUI, or BOTH).
- For Windows systems, installing the management utilities creates a QLogic BCU desktop shortcut on your system desktop. Select this to open a **Command Prompt** window in the folder where the BCU commands reside. You can then run enter full BCU commands (such as **bcu adapter - -list**) or enter **bcu - -shell** to get a bcu> prompt where only the command (**adapter - -list**) is required. The BCU shortcut provides quick access to the installation folder where you can perform the following tasks:
  - Run the Support Save feature
  - Reinstall drivers
  - Run adapter utilities

NOTE

Launching BCU on Windows systems through methods other than through the desktop shortcut is not recommended and may result in display of inconsistent information.

Linux systems

By default, the initrd file will backed up automatically during Linux installations. During installation, a dialog box displays with the location of the file. If a file exists, a dialog box displays with its current location and allows you to overwrite the file, not overwrite the file, or quit.

VMware systems

Because some versions of ESX and ESXi do not enforce maintenance mode during driver installation, it is recommended that you put the host in maintenance mode, as a system reboot is required after installation.

Installation examples

Following are some examples of using commands and parameters to install adapter software:

- To install the storage and network drivers in silent mode and start the HCM Agent automatically by default.

  Windows systems

  ```
  brocade_adapter_software_installer_windows_<version>.exe
  -DCHOSEN_INSTALL_SET=DRIVER -i silent
  ```

Linux systems

```
sh brocade_adapter_software_installer_linux_<version>.bin
-DCHOSEN_INSTALL_SET=DRIVER -i silent
```

Solaris systems

```
sh
brocade_adapter_software_installer_solaris_x86_<version>.bin
-DCHOSEN_INSTALL_SET=DRIVER -i silent
```

```
sh
brocade_adapter_software_installer_solaris_sparc_<version>.bi
n -DCHOSEN_INSTALL_SET=DRIVER -i silent
```

- To install the driver packages, HCM, and management utilities in silent mode.

  Windows systems:

  ```
  brocade_adapter_software_installer_windows_<platform>_<versio
  n>.exe -DCHOSEN_INSTALL_SET=BOTH -i silent
  ```

  Linux systems:

  ```
  sh brocade_adapter_software_installer_linux_<version>.bin
  -DCHOSEN_INSTALL_SET=BOTH -i silent
  ```

  Solaris systems:

  ```
  sh
  brocade_adapter_software_installer_solaris_x86_<version>.bin
  -DCHOSEN_INSTALL_SET=BOTH -i silent
  ```

  ```
  sh
  brocade_adapter_software_installer_solaris_sparc_<version>.bi
  n
  -DCHOSEN_INSTALL_SET=BOTH -i silent
  ```

- To overwrite existing driver packages with the new driver packages on a Windows system using silent mode.

  ```
  brocade_adapter_software_installer_windows_<version>.exe
  -DCHOSEN_INSTALL_SET=DRIVER -DFORCE_WIN_DRIVER_INSTALLATION=1
  -i silent
  ```

- To install drivers in silent mode and overwrite the existing backed-up initrd file in Linux systems.

  ```
  sh brocade_adapter_software_installer_linux_<version>.bin
  -DCHOSEN_INSTALL_SET=BOTH -FORCE_INITRD_BACKUP=YES -i silent
  ```

- To install HCM interactively.

  Windows systems

  ```
  brocade_adapter_software_installer_windows_<platform>_<versio
  n>.exe
  ```

  Linux systems

  ```
  sh brocade_adapter_software_installer_linux_<version>.bin
  ```

  Solaris systems

  ```
  sh
  brocade_adapter_software_installer_solaris_x86_<version>.bin
  ```

  ```
  sh
  brocade_adapter_software_installer_solaris_sparc_<version>.bi
  n
  ```

- To install the noarch driver on Linux systems in silent mode.

  ```
  sh brocade_adapter_software_installer_linux_<version>.bin
  -DCHOSEN_INSTALL_SET=DRIVER -DCONT_NOARCH_DRIVER=YES -i
  silent
  ```

Installing HCM and driver package in silent mode using file option

By identifying the default installation properties file after the software installer command, HCM, the storage driver, and the network driver are installed by default in silent mode. The HCM Agent starts automatically after installation. This is the recommended method for silent installation.

NOTE

BR-804 and BR-1007 adapters are not supported on Solaris systems, so Solaris options in this section do not apply.

Use the following steps.

1. At the command line, change to the directory where the installer is located.
2. Use the following commands to initiate silent installation using the properties file.

   - Windows systems

     ```
     brocade_adapter_software_installer_windows_<version>.exe
     -f HCMDefaultInstall.properties
     ```

   - Linux systems

     ```
     brocade_adapter_software_installer_linux_<version>.bin -f
     HCMDefaultInstall.properties
     ```

   - Solaris systems

     ```
     brocade_adapter_software_installer_solaris_x86_<version>.
     bin -f HCMDefaultInstall.properties

     brocade_adapter_software_installer_solaris_sparc_<version
     >.bin -f HCMDefaultInstall.properties
     ```

Software removal using Adapter Software Uninstaller

Use the following steps to remove the adapter driver packages and HCM. Instructions are provided for using the GUI-based or command-based QLogic Adapter Software Installer. Instructions are provided for Windows, Solaris, and Linux systems.

Important notes

Review these notes for removing the QLogic BR-Series Adapter software from your system:

- Use steps in this section to remove HCM.
- Before removing adapter software, It is strongly recommended that you stop the HCM agent and shut down the HCM application if it is running on your system. For instructions on stopping the HCM Agent, refer to “HCM Agent operations” on page 183.
- When removing HCM you may be prompted to backup existing configuration data. Refer to “HCM configuration data” on page 186 for more information.

Using the QLogic Software Uninstaller

Use the following steps to remove software that was installed with the GUI-based QLogic Adapter Software Installer, native system scripts, and system commands. Instructions are provided for Windows, Linux, and Solaris systems.

NOTE

Also use these procedures if HCM is installed on VMware and VMware operates as a “guest” on your Windows system.

1. Perform one of the following steps depending on your host operating system:

   For **Windows** systems, perform one of the following steps:

   - Select **QLogic Adapter Software** from the Windows **Start** menu, and then select **Uninstall QLogic Adapter Software**.
   - To use the command line, use the following steps.

     a. At the command line, change to the directory where the installer is located.

     ```
     cd <install directory>\UninstallBrocade Adapter
     Software <version>
     ```

     NOTE

     The default <install directory> is C:\Program Files\BROCADE\Adapter.

     b. Enter the following command to launch the QLogic Adapter Software Uninstaller.

     ```
     Uninstall.bat
     ```

   For **Linux** and **Solaris** systems, perform the following steps.

   a. Change to the directory where the Adapter Software Installer application is installed using the following command:

   ```
   cd <install directory>/UninstallBrocade Adapter Software
   <version>
   ```

   where:

   `<install directory>`—default install directory is /opt/brocade/adapter.

   `<version>`—the application version, such as v3.0.

b. Enter the following command to launch the QLogic Adapter Software Uninstaller:

```
sh Uninstall.sh
```

2. When an Introduction message displays about the uninstall, click **Next**.
3. If a message displays prompting you to close HCM, close the application if it is running, and then click **OK** on the message box.
4. When the **Uninstall Options** screen displays (Figure 3-7) with uninstall options, select an option.
   - Select **Complete Uninstall** to remove the driver packages and all other installed QLogic BR-Series Adapter software components.
   - Select **Uninstall Specific Features** to selectively uninstall specific software components.

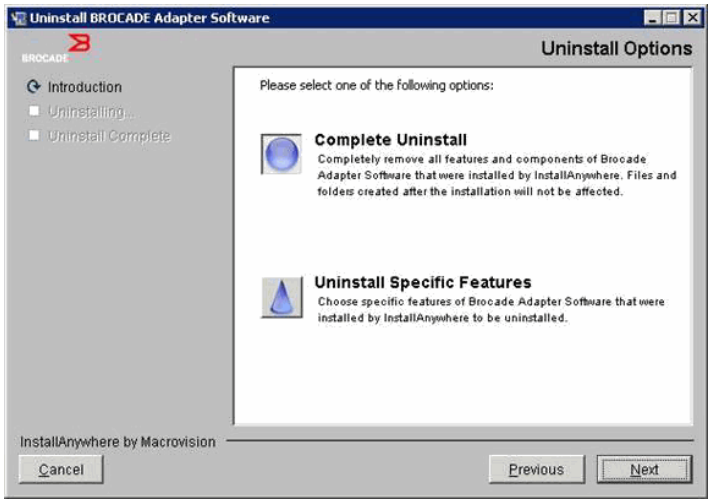

Uninstall BROCADE Adapter Software
Uninstall Options
Introduction
Uninstalling...
Uninstall Complete
Please select one of the following options:
Complete Uninstall
Completely remove all features and components of Brocade Adapter Software that were installed by InstallAnywhere. Files and folders created after the installation will not be affected.
Uninstall Specific Features
Choose specific features of Brocade Adapter Software that were installed by InstallAnywhere to be uninstalled.
InstallAnywhere by Macrovision
Cancel
Previous
Next

Figure 3-7. Uninstall Options screen

5. Select **Next**.
   - If you selected **Complete Uninstall**, a screen displays showing software removal progress.
   - If you selected **Uninstall Specific Features**, a **Choose Product Features** screen displays from which you can select features for removal. Remove check marks by features that you wish to uninstall, and then select **Uninstall** to continue with software removal.
6. If a message box displays asking if you want to back up HCM configurations, click **Yes** or **No**.

If you select **Yes**, a dialog box displays prompting you to select a backup directory. Use the default directory or browse to another location. Select **Uninstall** to perform backup and remove software.

A screen eventually displays notifying you of a successful uninstall. If a message displays on this screen notifying you of leftover files in the installation path, make sure that you delete these manually after removal completes.

7. Click **Done**.
8. If a message for rebooting the system displays, select the reboot option to complete the software removal process.

Using Software Uninstaller commands

The following steps explain how to use the Adapter Software Uninstaller commands to remove the network and storage driver packages and HCM from Windows, Linux, and Solaris systems. These commands automatically remove software that you specify without using a GUI-based program that requires user interaction.

Executing the following commands without parameters will launch the GUI-based uninstaller described under “Using the QLogic Software Uninstaller” on page 130.

- Windows systems

  ```
  Uninstall.bat
  ```

- Linux and Solaris systems

  ```
  sh Uninstall.sh
  ```

Execute these same commands on the host system’s command line with various parameters to automatically remove the network and storage driver packages, HCM application, or both without requiring further user interaction.

- Windows systems

  ```
  Uninstall.bat -DCHOSEN_INSTALL_SET=[DRIVER|GUI|BOTH]
  -DEBUG=[true|false]
  -i silent
  ```

- Linux and Solaris systems

  ```
  sh Uninstall.sh -DCHOSEN_INSTALL_SET=[DRIVER|GUI|BOTH]
  -DEBUG=[true|false]
  -i silent
  ```

  where:

`DCHOSEN_INSTALL_SET` specifies to remove either the network and storage driver packages, the GUI (HCM), or all components.

`DEBUG` specifies whether the debug log messages are needed. Possible values are true or false.

`i silent` specifies that the uninstallation mode is silent.

Important notes

Review these notes before using the software uninstaller commands.

- If you choose to remove the driver, both the storage and network drivers are removed.
- Parameters are case-sensitive.
- To enter uninstaller commands, first change to the directory where the adapter software is installed (cd <install directory>).
  - Windows systems

    ```
    cd <install directory>\UninstallBrocade Adapter Software
    ```

    The default <install directory> is C:\Program Files\BROCADE\Adapter.
  - Linux and Solaris systems

    ```
    cd <install directory>/UninstallBrocade Adapter Software
    ```

    The default <install directory> is /opt/brocade/adapter.
- To launch the uninstaller in silent mode, you must use and provide values for both the following parameters:
  - DCHOSEN_INSTALL_SET
  - -i silent

Uninstall examples

- To remove the network and storage drivers only in silent mode with debug messages.

  Windows systems

  ```
  Uninstall.bat -DCHOSEN_INSTALL_SET=DRIVER -DEBUG=true -i
  silent
  ```

  Linux or Solaris systems

  ```
  sh Uninstall.sh -DCHOSEN_INSTALL_SET=DRIVER -DEBUG=true
  silent
  ```

- To remove the network and storage drivers, HCM, and management utilities in silent mode, but without debug messages.

  Windows systems

  ```
  Uninstall.bat -DCHOSEN_INSTALL_SET=BOTH -DEBUG=false -i
  silent
  ```

  Linux or Solaris systems

  ```
  sh Uninstall.sh -DCHOSEN_INSTALL_SET=BOTH -DEBUG=false silent
  ```

- To remove HCM only without using silent mode, but with debug messages.

  Windows systems

  ```
  Uninstall.bat -DCHOSEN_INSTALL_SET=GUI -DEBUG=true
  ```

  Linux or Solaris systems

  ```
  sh Uninstall.sh -DCHOSEN_INSTALL_SET=GUI -DEBUG=true
  ```

Software upgrade using the QLogic Adapter Software Installer

To upgrade HCM, adapter driver packages, or the driver packages and HCM, simply follow the instructions under “Using the GUI-based installer” on page 114 or “Software installation using Software Installer commands” on page 120. You do not need to remove the existing software first. However, refer to the following important notes when upgrading, as procedures may vary from first-time installation on specific operating systems.

- Windows systems
  - When upgrading the driver for Windows systems, you do not need to reboot after installation.
  - The recommended procedure for upgrading Windows drivers is to install the new driver without first removing the existing driver.
  - When using the QLogic Adapter Software Installer commands for installation and an existing driver is installed on the system, you must use the following parameter to overwrite with the new driver.

    ```
    -DFORCE_WIN_DRIVER_INSTALLATION=1
    ```

For example, to overwrite the existing driver packages with the new driver packages and start the HCM Agent automatically, use the following command.

```
brocade_adapter_software_installer_windows_<platform>_<ve
rsion>.exe -DCHOSEN_INSTALL_SET=DRIVER
-DFORCE_WIN_DRIVER_INSTALLATION=1 -i silent
```

For example, to overwrite the existing drivers with the new drivers, use the following command.

```
brocade_adapter_software_installer_windows_<platform>_<ve
rsion>.exe -DCHOSEN_INSTALL_SET=BOTH
-DFORCE_WIN_DRIVER_INSTALLATION=1 -i silent
```

- ❑ If VLAN configurations exist (CNAs and Fabric Adapter ports configured in CNA mode), a backup message displays during upgrade or reinstallation of drivers. This message will note the location where configurations were stored. You can restore these configurations after installation completes.

- Linux systems

  When upgrading the driver for Linux systems, you do not need to reboot the host system after installation.

- Solaris systems

  When upgrading the driver for Solaris systems, you must reboot the host system. The new driver is effective after system reboot.

- VMware systems

  When upgrading the driver for VMware systems, you must reboot the host system. The new driver is effective after system reboot. Because some versions of ESX and ESXi do not enforce maintenance mode during driver installation, it is recommended that you put the host in maintenance mode, as a system reboot is required after installation.

- Software installation or upgrade on a host system with a large number of adapters could take much longer than normal.

NOTE

To make sure that the drivers and adapter boot code are synchronized, be sure to update your adapter with the latest boot image from the QLogic Web Site at http://driverdownloads.qlogic.com whenever you install or update adapter driver packages. Refer to “Boot code updates” on page 189 for update instructions.

Software downgrade using the QLogic Adapter Software Installer

Although driver and HCM downgrades are not supported, the following procedures are recommended for downgrading between versions 3.2. 3.0, 2.3, 2.2, 2.1, 2.0, and 1.1.

NOTE

Downgrading the driver is not supported when downgrading from 3.2.1 to earlier versions. However, it is possible to restore the v3.2.1 configuration for v2.3 if you explicitly save the configuration before removing 3.2.1 and installing v2.3.

Downgrading HCM only or HCM and driver

Use the following procedure to successfully downgrade HCM since its configuration is not automatically persisted during a downgrade using the QLogic Adapter Software Installer (QASI).

Back up data

Use the following steps to back up HCM data:

1. Uninstall the existing (higher) version of HCM using instructions under “Software removal using Adapter Software Uninstaller” on page 130.
2. When the message displays prompting you to back up the HCM configuration (refer to “HCM configuration data” on page 186), select **Backup** to continue.
3. When the default backup directory location displays, you can select a different location for the backup data.
4. Select **Uninstall**.

   HCM data is backed up in the background and HCM is un-installed.

Restore data

Use the following steps to restore HCM data:

1. Install the earlier version software using steps under “Using the QLogic Adapter Software Installer” on page 113.
2. If a backup a message displays prompting you to restore the data directory, select the restore configuration option and continue with the installation.

   Backup data for the previous (later) software successfully restores.

Downgrading driver only

1. Uninstall existing drivers using the procedures under “Software removal using Adapter Software Uninstaller” on page 130.
2. Install new drivers using the procedures under “Using the QLogic Adapter Software Installer” on page 113.

Installer log

A status log is available after installation that provides complete status of installed software components. The name of the installed component, version, and location in file system are provided. The Installation_Status.log is in the following locations:

- Windows - <user home>/brocade
- Linux and Solaris - /var/log/brocade

NOTE

When installing software in silent mode using installer commands, always refer to the status log for reboot requirements as messages are not output to the screen.

Using software installation scripts and system tools

This section provides instructions to use QLogic installation scripts and host operating system commands and tools to install, remove, and upgrade individual driver package components described under “Driver packages” on page 75. You can use these steps for installing software on your system instead of using the QLogic Adapter Software Installer.

NOTE

To upgrade existing software using the QLogic Adapter Software Installer, refer to “Using the GUI-based installer” on page 114.

Instructions are provided in this section for the following tasks:

- Selectively installing network drivers, storage drivers, and utilities to Windows, Linux, and VMware systems using QLogic installation scripts.
- Installing driver packages on Solaris systems using “native” system installer commands.

Software installation and removal notes

- The following steps assume that the host's operating system is functioning normally and that all adapters have been installed in the system.
- When upgrading Windows drivers, install the new driver without first removing the existing driver. This is the is recommended procedure.
- Software installation or upgrade on a host system with a large number of adapters could take much longer than normal.
- Download the driver package for your host system operating system and platform from the QLogic Web Site at http://driverdownloads.qlogic.com.
- Refer to "Software installation and driver packages" on page 81 and "Host operating system support" on page 70 for details on driver packages and operating system support. Also download the latest release notes on the QLogic Web Site at http://driverdownloads.qlogic.com.
- There are firewall issues with HCM Agent on VMware systems. When installing the driver package on these systems, open TCP/IP port 34568 to allow agent communication with HCM.
  - For VMware, use the following commands to open port 34568:

    ```
    /usr/sbin/esxcfg-firewall-o 34568,tcp,in,https
    /usr/sbin/esxcfg-firewall-o 34568,udp,in,https
    ```
  - For Windows, use Windows Firewall and Advanced Service (WFAS) to open port 34568.
- The storage driver will claim all QLogic BR-Series Adapters with ports configured in HBA and CNA mode installed in a system.
- Installing a driver package or other adapter software does not automatically start the HCM Agent. You must manually start the agent using instructions under "HCM Agent operations" on page 183.
- If removing a driver package or other adapter software, first exit the HCM application and stop the HCM Agent. Stop the agent using instructions under "HCM Agent operations" on page 183.
- Removing driver packages with system commands is not recommended since this only removes the driver from the operating system stack and does not clean up the driver and utility directories. Use the QLogic Adapter Software Uninstaller program instead.
- Because some versions of ESX and ESXi do not enforce maintenance mode during driver installation, it is recommended that you put the host in maintenance mode, as a system reboot is required after installation.

- To make sure that the drivers and adapter boot code are synchronized, be sure to update your adapter with the latest boot image whenever you install or update adapter driver packages. Use the following steps.

  1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
  2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
  3. Click the **Boot Code** link at the top of the page to direct you to the boot code packages.
  4. Locate the boot code package for your adapter in the table, click on it, and then follow the directions.

  Refer to “Boot code updates” on page 189 for instructions to install the image.

- For Windows systems, installing the management utilities creates a QLogic BCU desktop shortcut on your system desktop. Select this to open a **Command Prompt** window in the folder where the BCU commands reside. You then run enter full BCU commands (such as **bcu adapter - -list**) or enter **bcu - -shell** to get a bcu> prompt where only the command (**adapter - -list**) is required.

Driver installation and removal on Windows systems

Use the following procedures to install, remove, and update driver packages on a Windows system. Only one driver installation is required for all adapters (CNAs, host bus adapters, or Fabric Adapters) installed in a host system.

Installation Notes

- Before installing the driver on Windows systems, install the following hot fixes from the Microsoft “Help and Support” website, and then reboot the system:

  - ❑ Windows 2008 R2

    KB977977 is recommended for CNAs and Fabric Adapter ports configured in CNA mode.

    KB2490742 is recommended when installing storage drivers to avoid a “Ox000000B8” stop error when shutting down or hibernating a system running Windows 7 or Windows Server 2008 R2.

- Although you can install the driver using the Windows Device Manager, use the driver installer script (brocade_installer.bat) or use the GUI- or command-based Adapter Software Installer (brocade_adapter_software_installer_windows_<*platform*>_<*version*>.exe) instead for installing, removing, and upgrading the driver. The QLogic installer programs provide these advantages:
  - Automatically updates all QLogic BR-Series adapters in one step. With Device Manager, you will need to update each adapter instance.
  - Enables the driver to register the symbolic names for the adapter ports with the switch. With Device Manager, the driver cannot obtain the operating system information to register these names.with the switch.
  - Avoids errors that can occur from removing software with the Device Manager that was originally installed with the QLogic installer programs, and then attempting future updates or removals.
- If removing driver packages or the HCM agent, determine if the HCM Agent is running using procedures under "HCM Agent operations" on page 183. If it is, stop the agent using steps under the same heading.

Installing and removing drivers on Windows systems

Use these steps to install storage and network driver packages on Windows systems. Refer to "Software installation and driver packages" on page 81 for a description of Windows driver packages.

1. Boot the host and log on with Administrator privileges.
2. Create a "CNA Drivers" or "HBA Drivers" directory in your host's file system depending on your installed adapter or mode configurations for installed Fabric Adapter ports.
3. Download the appropriate .exe driver package for your system. Refer to "Software installation and driver packages" on page 81 for a description of Windows driver packages.
4. Extract the driver packages to the folder you created in Step 2 using the following steps.
   a. Double-click the package file (for example, `brocade_driver_win2008_r2_x64_<version>.exe`) to extract the driver files.
   b. Enter a path or browse to the driver directory where you want to install the extracted files when prompted (for example, C:\Adapter Drivers). Note that you can specify a directory other than the default directory.
5. Go to the **command prompt** and change directories (cd) to the path where you extracted files in Step 4.

6. Enter the following command, using appropriate parameters to install or uninstall the driver package:

```
brocade_install.bat [INSTALL_OP=<INSTALL | UNINSTALL |
PREINSTALL>] [DRIVER_TYPE=<HBA | CNA | ETH | AUTO]
[LOG_FILE_PATH=<path to installer log>] [FORCED_INSTALL=TRUE]
[SILENT_INSTALL=TRUE] [SNMP=TRUE] [SNMP_ONLY=TRUE]
[W2K8_HOTFIX=<[""]|[<KBnnnnnn>:<Required|Optional><Descriptio
n>]]>]
[W2K3_HOTFIX=<[""]|[<KBnnnnnn>:<Required|Optional><Descriptio
n>]]>]
```

   where:

   - INSTALL_OP=

     INSTALL - Installs the storage and network drivers. This is the default behavior no options are used with `brocade_install.bat`.

     UNINSTALL - Removes all drivers corresponding to the DRIVER_TYPE option.

     PREINSTALL - Depending on the DRIVER_TYPE option used, either the host bus adapter, CNA (or both) driver will install to the driver store on the host system, However, this driver is only used when a new adapter is installed into an empty slot or an existing adapter is replaced. The operating system will continue to load the existing driver until this occurs. This is useful in mass deployment of operating systems when adapters have not been installed. Please note that preinstallation will not automatically be attempted when the installer does not find the corresponding hardware.

   - DRIVER_TYPE=

     HBA - The operation as specified by INSTALL_OP will be performed for Fibre Channel drivers only.

     CNA - The operation as specified by INSTALL_OP will be performed for network drivers only.

     ETH - The operation as specified by INSTALL_OP will be performed for network drivers for NIC operation only.

     AUTO - The operation as specified by INSTALL_OP will be performed for the drivers for adapters that are present in the system.

- LOG_FILE_PATH

  Specify path to installer log. Quote marks need to enclose the path needs when it contains a space. You can also specify system environmental variables for the path component. For example, LOG_FILE_PATH="%ProgramFiles%"\Brocade\Adapter\Driver\util\myinstal.log".

- FORCED_INSTALL= TRUE

  Use this option to force driver installation when the operating system displays messages such as, “The existing driver on this system is already better than the new one you are trying to install.”

- SILENT_INSTALL=TRUE

  Use this in automated script environments to avoid displaying any Windows dialog boxes during installation failure scenarios. In this case, you must analyze the log file to decode any failures during driver installation, uninstallation, or preinstallation operations.

- W2K3_HOTFIX, W2K8_HOTFIX=

  If INSTALL_OP = INSTALL, use this option to override the installed hot fix with a new hot fix or to avoid checking for a hot fix.

  To specify a new hot fix for override, use the format “<KBnnnnnn>:<Required|Optional>:<Description>”. For example W2K8_HOTFIX= “KB9987654:Required:newer_hotfix”.

  To avoid checking for hot fix, use the value “”. For example, W2K3_HOTFIX=””.

- SNMP=TRUE

  If management utilities containing SNMP files were installed, this installs the SNMP subagent, drivers, and other utilities.

- SNMP_ONLY=TRUE

  If management utilities containing SNMP files were installed, this installs the SNMP subagent only.

After entering options to install the software, a message box may display indicating that the target (existing) driver is newer than the source (upgrade) driver. Depending on the number of adapters installed, this message box may display more than once.

NOTE

You can also use the **brocade_install.bat** command to install the SNMP subagent. For details, refer to “Installing SNMP subagent” on page 180 for details.

7. Click **Continue Anyway** each time the message box displays to continue.

   As installation continues, a series of screens may display. The **Command Prompt** should return when installation completes.

8. If required by your Windows system, reboot the host. VMware, Linux, and Solaris require rebooting after installation.

9. Verify installation by launching the Device Manager to display all installed devices.

   - For CNAs, host bus adapters, and Fabric Adapters, when you expand the list of **SCSI and RAID controllers** or **Storage controllers**, an instance of the adapter model should display for adapter port installed.
   - For CNAs and Fabric Adapter ports configured in CNA or NIC mode, when you expand **Network adapters**, an instance of **QLogic 10G Ethernet Adapter** should also display for each port installed.

   For example, if two two-port CNAs (total of four ports) are installed, four instances of the adapter model display (two under **SCSI and RAID controllers** and two under **Network adapters**). As another example, if only one port on a Fabric Adapter is configured in CNA or NIC mode, two instances of the adapter model display (one under **SCSI and RAID controllers** and one under **Network adapters).**

10. If device instances do not display and instead instances display with yellow question marks under **Other Devices**, scan the Device Manager for hardware changes. To scan, right click on any device in the list and select **Scan for hardware changes**.

    After you scan for changes, the adapter should display in the Device Manager as described under Step 9.

11. If necessary, start the HCM Agent using steps under “HCM Agent operations” on page 183.

NOTE

Manually installing the driver package does not automatically start the HCM Agent.

12. When the driver is installed and the host system is connected to the fabric turn on host power and verify adapter operation. Verify proper LED operation for stand-up adapters by referring to “Adapter LED operation (stand-up adapters)” on page 283.

Command examples

Following are examples of using the **brocade_install.bat** command to install driver packages on Windows systems.

- Install all drivers

  ```
  brocade_install.bat
  ```

- Install all drivers in silent mode

  ```
  brocade_install.bat SILENT_INSTALL=TRUE
  ```

- Uninstall all drivers

  ```
  brocade_install.bat INSTALL_OP=UNINSTALL
  ```

- Install the Fibre Channel (storage) driver only

  ```
  brocade_install.bat DRIVER_TYPE=HBA
  ```

- To uninstall FC driver only

  ```
  brocade_install.bat INSTALL_OP=UNINSTALL DRIVER_TYPE=HBA
  ```

- Forcefully install the drivers

  ```
  brocade_install.bat FORCED_INSTALL=TRUE
  ```

- Override the installed hotfix with a new hotfix

  ```
  brocade_install.bat W2K8_HOTFIX=
  “KB9987654:Required:newer_hotfix”
  ```

- Avoid checking for hot fix

  ```
  brocade_install.bat W2K3_HOTFIX=""
  ```

Upgrading driver on Windows systems

To update the drivers, follow procedures under “Installing and removing drivers on Windows systems” on page 141.

NOTE

When upgrading the driver for Windows systems, you do not need to reboot the host system as the driver upgrades immediately. The upgrade reloads the adapter firmware and reinitializes the link.

Driver installation and removal on Linux systems

Use the install script to selectively install storage driver packages, network driver packages, and utilities to Linux systems.

The driver package is provided as an RPM package. If you are using a supported Linux driver package and standard host configuration, you can use these RPMs. Refer to “Software installation and driver packages” on page 81 for a description of packages and kernel versions that they support.

Installation Notes

Starting with SLES 11 SP2, the Brocade KMP packages are digitally signed by Novell with a “PLDP Signing Key.” If your system doesn't have the public PLDP key installed, RPM installation will generate a warning similar to the following:

```
warning:
brocade-bna-kmp-default-3.0.3.3_3.0.13_0.27-0.x86_64.rpm:
Header V3 RSA/SHA256 signature: NOKEY, key ID c2bea7e6
```

To ensure authenticity and integrity of the driver package, we recommend that you install the public PLDP key (if not already installed) before installing the driver package. The PLDP key and installation instructions can be found at http://drivers.suse.com/doc/pldp-signing-key.html.

Installing driver packages on Linux systems

1. Boot the host and log on with Administrator privileges.
2. Create an installation directory such as /opt/CNA or /opt/HBA, depending on your adapter.
3. Download the appropriate .tar.gz file for your Linux distribution. Refer to “Software installation and driver packages” on page 81 for a description of Linux driver packages.
4. Extract the driver packages to the directory you created in Step 2 using the following steps.

a. Enter a path or browse to the driver directory where you want to install the extracted files when prompted (for example /opt/CNA or /opt/HBA). Note that you can specify a directory other than the default directory.

b. To untar the source-based RPM for all Linux distributions.

```
tar -zxvf brocade_driver_linux_<version>.tar.gz
```

c. To untar the precompiled RPMs for RHEL and OL distributions.

```
tar -zxvf brocade_driver_linux_rhel_<version>.tar.gz
```

d. To untar the precompiled RPMs for SLES distributions.

```
tar -zxvf brocade_driver_linux__sles_<version>.tar.gz
```

5. Change to the directory where extracted the driver packages if you are not there already.

6. Enter the following command to run the installer on RHEL and SLES systems while you are in the directory where you extracted

```
brocade_install_rhel.sh
[-u,-h][--update\--add\--rm-initrd][--force-uninstall][--snmp
] [--snmp-only]


brocade_install_sles.sh [-u,-h] [--update\--add\--rm-initrd]
[--force-uninstall]
```

where:

`-u` uninstalls driver RPM packages.

`-h` displays help for install script.

Initial RAM disk options:

--update-initrd

Updates or adds the storage driver (bfa) to initrd. Note that you should only update the initrd if you are intending to use the boot from SAN feature. If the storage driver (bfa) is listed under /etc/sysconfig/kernel (SUSE) and /etc/modprobe.conf (RHEL), RPM installation automatically updates the initrd.

--add-initrd

Adds the driver to initrd and rebuilds.

--rm-initrd

Removes the driver from initrd and rebuilds.

--force-uninstall

Removes all installed drivers (network, storage, and utilities). Reboot may be required if removal of bna or bfa driver fails.

--snmp

If management utilities containing SNMP files were installed, this installs the SNMP subagent, drivers, and other utilities.

--snmp-only

If management utilities containing SNMP files were installed, this installs the SNMP subagent only.

Examples:

- To install all RPMs (network, storage, and utilities), enter one of the following commands:

  ```
  brocade_install_rhel.sh
  brocade_install_sles.sh
  ```

- To install all RPMs and add storage (bfa) driver to initrd, enter one of the following commands.

  ```
  brocade_install_rhel.sh --update-initrd
  brocade_install_sles.sh --update-initrd
  ```

- To remove all RPMs, enter one of the following commands:

  ```
  brocade_install_rhel.sh -u
  brocade_install_sles.sh -u
  ```

- To force removal of all RPMs, enter one of the following commands.

  ```
  brocade_install_rhel.sh --force-uninstall
  brocade_install_sles.sh --force-uninstall
  ```

- To display help, enter one of the following commands:

  ```
  brocade_install_rhel.sh -h
  brocade_install_sles.sh -h
  ```

7. Verify if a network or storage driver package is loaded to the system with the following commands:

   ```
   rpm -qa|grep bfa
   ```

   This command prints the names of the storage driver package (bfa) if installed.

   ```
   rpm -qa|grep bna
   ```

This command prints the names of the network driver package (bna) if installed.

```
lspci
```

This utility displays information about all PCI buses in the system and all devices connected to them. **Fibre Channel: QLogic Corporation** displays for an host bus adapter or Fabric Adapter port configured in HBA mode. **Fibre Channel: QLogic Corporation** and **Ethernet Controller** display for a CNA or Fabric Adapter port configured in CNA or NIC mode if driver packages have correctly loaded.

```
lsmod
```

This command displays information about all loaded modules. If **bfa** appears in the list, the storage driver is loaded to the system. If **bna** appears in the list, the network driver is loaded to the system.

```
dmesg
```

This command prints kernel boot messages. Entries for **bfa** (storage driver) and **bna** (network driver) should display to indicate driver activity if the hardware and driver are installed successfully.

8. Start the HCM Agent by using steps under “HCM Agent operations” on page 183.

NOTE

Manually installing the driver package with installation scripts does not automatically start the HCM Agent.

9. When the driver is installed and the system is connected to the fabric, verify adapter operation. Verify LED operation for stand-up adapters by referring to “Adapter LED operation (stand-up adapters)” on page 283.

Upgrading driver on Linux systems

To update the driver package simply install the new driver and HCM package using steps under “Driver installation and removal on Linux systems” on page 146.

NOTE

When upgrading the driver for Linux systems, you do not need to reboot the host system. The new driver is effective after system reboot.

Installing and removing driver packages on Citrix XenServer systems

The following procedures install drivers and utilities supporting Citrix XenServer version 6.1 as an example. Installing packages for other Citrix XenServer versions is similar.

Installing driver packages on Citrix XenServer systems

1. Boot the host and log on with Root privileges.
2. Download the appropriate .tar.gz file for your Linux distribution. Refer to "Software installation and driver packages" on page 81 for a description of Linux driver packages. For XenServer v6.1, download the following file:

   brocade_driver_linux_xen61_<version>.tar.gz
3. Extract the driver package.

   ```
   [root@xenserver-my dir]# tar zxvf
   brocade_driver_linux_xen61_v3-2-1-0.tar.gz

   brocade-bfa-3.2.1.00801-xen-6.1.0.iso
   brocade-bfautil_noioctl-3.2.1.0-0.noarch.rpm
   brocade-bna-3.2.1.00801-xen-6.1.0.iso
   driver-bld-info.xml
   ```
4. Mount the storage driver iso file.

   ```
   [root@xenserver-my dir]# mkdir /iso
   [root@xenserver-my dir]# mount -o loop
   brocade-bfa-3.2.1.0-xen-6.1.0.iso /iso
   ```
5. Change to the mount point directory.

   ```
   [root@xenserver-my dir]# cd /iso/
   ```
6. List the files in the iso.

   ```
   [root@xenserver-my dir]# ls

   brocade-bfa-modules-kdump-2.6.32.43-0.4.1.xs1.6.10.734.170748
   -3.2.1.0-0.i386.rpm
   brocade-bfa-modules-xen-2.6.32.43-0.4.1.xs1.6.10.734.170748-3
   .2.1.0-0.i386.rpm
   install
   install.sh  XS-PACK
   ```

7. Install the storage (bfa) driver.

```
[root@xenserver-my iso]# ./install.sh

Installing 'Brocade FC HBA driver.'...

Preparing... ########################################### [100%]

1:brocade-bfa-modules-kdu########################################### [ 50%]
2:brocade-bfa-modules-xen########################################### [100%]
Memory required by all installed packages: 587202560
Current target 780140544 greater, skipping
Pack installation successful.
```

8. Unmount the storage (bfa) driver iso file.

```
[root@xenserver-my dir]# umount /iso
```

9. Mount the network (bna) driver iso file.

```
[root@xenserver-my dir]# mount -o loop brocade
brocade-bfa-3.2.1.00801-xen-6.1.0.iso
brocade-bna-3.2.1.00801-xen-6.1.0.iso
brocade-bfautil_noioctl-3.2.1.0-0.noarch.rpm
brocade_driver_linux_xen61_v3-2-1-0.tar.gz

[root@xenserver-my dir]# mount -o loop
brocade-bna-3.2.1.0-xen-6.1.0.iso /iso
```

10. Change to the mount point directory.

```
[root@xenserver-my dir]# cd /iso/
```

11. Install the network (bna) driver iso file.

```
[root@xenserver-my iso]# ./install.sh
Installing 'QLogic 10G Ethernet Driver.'...
Preparing... ########################################
[100%]

1:brocade-bna-modules-xen############################################
####### [ 50%]

2:brocade-bna-modules-kdu############################################
####### [100%]
Memory required by all installed packages: 587202560
Current target 780140544 greater, skipping
Pack installation successful.
```

12. Unmount the network (bna) driver iso file.

```
[root@xenserver-my dir]# umount /iso
```

13. List files in the directory.

```
[root@xenserver-umfzwtyv test]# ls -1
brocade-bfa-3.2.1.00801-xen-6.1.0.iso
brocade-bfautil_noioctl-3.2.1.0-0.noarch.rpm
brocade-bna-3.2.1.00801-xen-6.1.0.iso
brocade_driver_linux_xen61_v3-2-1-0.tar.gz
driver-bld-info.xml
```

14. Install the bfa utilities.

```
[root@xenserver-my dir]# rpm -ivh
brocade-bfautil_noioctl-3.2.1.0-0.noarch.rpm
Preparing... ########################################
[100%]

1:brocade-bfautil_noioctl############################################
####### [100%]
Install cli ... done
Install HBAAPI library ... done
```

Installing utilities when they conflict with inbox utilities

After you install the bfa utilities a warning message such as the following may display if using the driver on a server running XenServer v6.1 with the inbox driver.

```
Preparing... ########################################### [100%]
file /opt/brocade/adapter/bfa/bfa_cfg.sh from install of
brocade-bfautil_noioctl-3.2.1.0-0.noarch conflicts with file from
package brocade-bfautil-3.1.0.0-0.i386
file /usr/bin/bfa_supportsave from install of
brocade-bfautil_noioctl-3.2.1.0-0.noarch conflicts with file from
package brocade-bfautil-3.1.0.0-0.i386
file /usr/bin/bfa_supportshow from install of
brocade-bfautil_noioctl-3.2.1.0-0.noarch conflicts with file from
package brocade-bfautil-3.1.0.0-0.i386
```

If this error occurs, use the following steps to uninstall the existing utilities and install the current utilities that you extracted from the .tar.gz file.

1. List QLogic drivers and utilities on the system (conflicting utility is highlighted in red)

   ```
   [root@xenserver-my dir]# rpm -qa | grep brocade-bfautil
   brocade-bfa-modules-kdump-2.6.32.43-0.4.1.xs1.6.10.734.170748
   -3.2.1.0-0
   brocade-bfautil_noioctl-3.2.1.00506-0
   brocade-bfa-modules-xen-2.6.32.43-0.4.1.xs1.6.10.734.170748-3
   .2.1.0-0
   ```

2. Remove the currently installed bfa utility package.

   ```
   [root@xenserver-my dir]# rpm -e brocade-bfautil-3.1.0.0-0
   ```

3. Install the correct bfa utility package.

   ```
   [root@xenserver-my dir]# rpm -ivh
   brocade-bfautil_noioctl-3.2.1.00801-0.noarch.rpm
   Preparing...##########################################
   [100%]

   1:brocade-bfautil_noioctl#####################################
   ####### [100%]
   Install cli ... done
   Install HBAAPI library ... done
   ```

Removing driver packages on Citrix XenServer systems

The following procedures remove drivers and utilities supporting Citrix XenServer version 6.1 as an example. Removing packages for other Citrix XenServer versions is similar.

1. Boot the host and log on with Administrator privileges.
2. List the drivers and utilities on the system.

```
root@xenserver-umfzwtyv iso]# rpm -qa | grep brocade
brocade-bfa-modules-kdump-2.6.32.43-0.4.1.xs1.6.10.734.170748
-3.2.1.0-0
brocade-bna-modules-xen-2.6.32.43-0.4.1.xs1.6.10.734.170748-3
.2.1.0-0
brocade-bfautil_noioctl-3.2.1.0-0
brocade-bfa-modules-xen-2.6.32.43-0.4.1.xs1.6.10.734.170748-3
.2.1.0-0
brocade-bna-modules-kdump-2.6.32.43-0.4.1.xs1.6.10.734.170748
-3.2.1.0-0
```

3. Remove the drivers from the system.

```
[root@xenserver-umfzwtyv iso]# rpm -e
brocade-bfa-modules-kdump-2.6.32.43-0.4.1.xs1.6.10.734.170748
-3.2.1.0-0
brocade-bna-modules-xen-2.6.32.43-0.4.1.xs1.6.10.734.170748-3
.2.1.0-0
brocade-bfa-modules-xen-2.6.32.43-0.4.1.xs1.6.10.734.170748-3
.2.1.0-0
brocade-bna-modules-kdump-2.6.32.43-0.4.1.xs1.6.10.734.170748
-3.2.1.0-0
```

Driver installation and removal on Solaris systems

Use the following steps to install, remove, and upgrade the driver and utility packages on Solaris systems.

Installing driver packages on Solaris systems

Use the following steps to install driver and utility packages to Solaris systems. Driver packages install as the following:

- Storage drivers - bfa_driver_<operating system>_<version>.pkg
- Network drivers - bna_driver_<operating system>_<version>.pkg
- User utilities - brcd_util_<operating system>_<version>.pkg

Refer to “Software installation and driver packages” on page 81 for a description of host systems that this driver package supports.

NOTE

Root access is required to install or remove the driver package.

1. Log on to the Solaris system as a super user.
2. Copy the brocade_driver_<operating system>_<version>.tar to your system's /tmp directory

NOTE

brocade_driver_<operating system>_<version>.tar contains all drivers for specific Solaris distributions. For example, brocade_driver_solaris_<version>.tar contains all storage drivers for Solaris systems, where <version> is the version number of the driver release.

3. Using the change directory (cd) command, change to the directory where you copied the driver package .tar file.
4. Perform the following steps.
   a. Enter the following command and press **Enter** to untar the file.

      ```
      # tar xvf brocade_driver_<operating system>_<version>.tar
      ```

      This extracts the driver, packages, utilities packages, and installation script:

      - Storage drivers - bfa_driver_<operating system>_<version>.pkg
      - Network drivers - bna_driver_<operating system>_<version>.pkg
      - User utilities - brcd_util_<operating system>_<version>.pkg
      - Installation script - brocade_install.sh

   b. Enter the following command to remove all old packages (if installed) and install new ones.

      ```
      # ./brocade_install.sh
      ```

5. Enter the following to restart, load the driver, and reconfigure the system:

   ```
   # reboot -- -r
   ```

6. Verify if the driver packages are loaded to the system with the following commands:

```
# pkginfo|grep bfa
# pkginfo|grep bna
# pkginfo|grep brcd-util
```

NOTE

You can use the pkginfo -l command to display details about installed drivers.

7. Start the HCM Agent by using steps under “HCM Agent operations” on page 183.

NOTE

Manually installing the driver package does not automatically start the HCM Agent.

8. When a driver is installed and the host system is connected to the fabric turn on host power and verify adapter operation. Verify proper LED operation for stand-up adapters by referring to “Adapter LED operation (stand-up adapters)” on page 283.

Removing driver packages from Solaris systems

Use the following steps to remove driver and utility packages.

NOTE

Root access is required to remove the packages.

1. Log on to your system as root user.
2. Determine if the driver and utility packages are installed using the following commands:

```
# pkginfo|grep bfa
# pkginfo|grep bna
# pkginfo|grep brcd-util
```

3. Determine if the HCM Agent is running using procedures under “HCM Agent operations” on page 183. If it is, stop the agent using steps under the same heading.

4. From any directory, enter the following commands to remove installed packages:

```
# pkgrm bfa
# pkgrm bna
# pkgrm brcd-util
```

5. Respond to prompts “Do you want to remove this package?” by entering **y**.
6. Respond to prompts “Do you want to continue with the removal of this package?” by entering **y**.

   After a series of messages, the following confirms removal:

```
# Removal of <bfa> was successful.
# Removal of <bna> was successful.
# Removal of <brcd-util> was successful.
```

Upgrading driver on Solaris systems

To update driver packages, simply install new packages using steps under “Installing driver packages on Solaris systems” on page 154.

NOTE

When upgrading the drivers for Solaris systems, you must reboot the host system. The new drivers are not effective until after system reboot.

Driver installation and removal on VMware systems

Examples are provided in this section to install adapter drivers on ESX and ESXi systems using the following methods:

- The QLogic installer script. Refer to “Management utilities” on page 77 for more information accessing installer scripts.
- VMware vSphere Virtual CLI (vCLI). Refer to your VMware vCLI documentation to download and install vCLI.
- Image Builder with PowerCLI. Refer to the appropriate VMware documentation for more details.
- VMware vSphere Management Assistant (VMA). Download vMA from the VMware website. Once vMA is downloaded please refer to the vSphere Management Assistant Guide for instructions on how to deploy vMA.
- VMware vSphere Update Manager. Refer to your VMware vSphere Update Manager documentation for instructions on installing and using this application.

- VMware Console Operating System (COS) or Direct Console User Interface (DCUI). Refer to your VMware documentation for background on these systems.

Installation Notes

Refer to these important notes before installation on VMware systems.

- The HCM agent that installs with the driver package is not supported on VMware ESXi systems. HCM access to HCM is available for these systems through CIM Provider using the ESXi Management feature. Refer to "HCM and BNA support on ESXi systems" on page 75
- Because some versions of ESX and ESXi do not enforce maintenance mode during driver installation, it is recommended that you put the host in maintenance mode, as a system reboot is required after installation.
- You can use the VMware Image Builder PowerCLI to create a brocade_esx50_<version>.zip offline bundle and brocade_esx50_<version>.iso ESXi 5.0 installation image that includes brocade drivers and utilities. Refer to your Image Builder documentation for details on using Image Builder PowerCLI.

Using the QLogic installer script for ESX 4.1, ESXi 4.1, and ESXi 5.0 systems

This section provides instructions for using the QLogic installer script to install driver packages on ESX 4.1, ESXi 4.1, and ESXi 5.0 systems.

Drivers are provided as ISO images packaged in a tarball file. Use the install script to selectively install storage and network driver packages with utilities to VMware systems. Refer to "Software installation and driver packages" on page 81 for a description of driver packages and download instructions.

Ensure that the following prerequisites are met before installation:

- The vSphere Management Assistant (vMA) must be installed on an ESX and ESXi systems other than where you are installing the driver. Download vMA from the VMware website. Once vMA is downloaded please refer to the *vSphere Management Assistant Guide* for instructions on how to deploy vMA.
- Put the server (where the driver is to be installed) in maintenance mode using vSphere client. Using the vSphere Client, right click ESXi and select the **Enter Maintenance Mode** option.

Installation procedure

1. Download the VMware driver package from the QLogic Web Site. Refer to “Software installation and driver packages” on page 81 for details on driver packages and download instructions.
2. Copy the package to your system’s /tmp directory.

   ```
   scp brocade_driver_<esxversion>_<driverversion>.tar.gz
   path/tmp
   ```

3. From the temporary directory, extract the file using the following command.

   ```
   tar zxvf brocade_driver_<esxversion>_<driverversion>.tar.gz
   ```

4. Enter one of the following command to run the installer.

   - For ESX 4.1 systems, use the following command.

     ```
     brocade_install.sh {-u,-h, -n, -t}
     ```
     where:

     u uninstalls driver all packages, utilities, and HCM Agent.

     h displays help for install script.

     n Installs all packages without prompting.

     t installs tools only (utilities and HCM agent).

   - For ESXi 4.1 and ESXi 5.0 systems, use the following command.

     ```
     brocade_install_esxi.sh {-u, -h, -n}
     ```

     where:

     u uninstalls driver all packages, utilities, and HCM Agent.

     h displays help for install script.

     n Installs all packages without prompting.

   Examples:

   - To install network and storage RPMs with utilities, enter one of the following commands based on your operating system.

     ```
     brocade_install.sh

     brocade_install_esxi.sh
     ```

- To remove the storage and network RPM and utilities, enter one of the following commands based on your operating system.

  ```
  brocade_install.sh -u

  brocade_install_esxi.sh -u
  ```

- To display help, enter one of the following commands based on your operating system.

  ```
  brocade_install.sh -h

  brocade_install_esxi.sh -h
  ```

5. Reboot the system.
6. Using the vSphere client, exit maintenance mode.
7. Determine if the driver package is installed using the following command.

   ```
   esxcfg-module -l
   ```

   This lists loaded module names. Verify that an entry for bfa exists for the storage driver and an entry for bna exists for the network driver.
8. Display the latest versions of installed drivers using the following commands. Look for bfa (storage driver) and bna (network driver) entries and related build number.

   - For ESX 4.1, enter the following command.

     ```
     cat /proc/vmware/version
     ```

   - For ESXi 5.0, enter the following command.

     ```
     esxcli software vib list
     ```

   - For ESXi 4.1, use the following commands.

     ```
     esxcfg-module -s bfa
     esxcfg-module -s bna
     ```

9. Start the HCM Agent by using steps under “HCM Agent operations” on page 183.

NOTE

Manually installing the driver package does not automatically start the HCM Agent.

10. When the driver is installed and host is connected to the fabric, turn on the host system and verify adapter operation. Verify proper LED operation for stand-up adapters by referring to one of the following locations:
    - “Adapter LED operation (stand-up adapters)” on page 283.
    - “Adapter LED operation (stand-up adapters)” on page 293

Using vMA to install driver packages on ESXi 4.1 systems

This section provides steps to use the VMware vSphere Management Assistant (vMA) to install driver packages on ESXi 4.1 systems. To install driver packages on ESX 4.1 and ESXi 5.0 systems, refer to “Using the QLogic installer script for ESX 4.1, ESXi 4.1, and ESXi 5.0 systems” on page 158.

Ensure that the following prerequisites are met before installation:

- The vSphere Management Assistant (vMA) must be installed on an ESX system other than where you are installing the driver. Download vMA from the VMware website. Once vMA is downloaded please refer to the *vSphere Management Assistant Guide* for instructions on how to deploy vMA.
- Put the ESXi server (where the driver is to be installed) in maintenance mode using vSphere client. Using the vSphere Client, right click ESXi and select the **Enter Maintenance Mode** option.

Use the following steps to install the driver package.

1. Download the VMware driver package from the QLogic Web Site. Refer to “Software installation and driver packages” on page 81 for details on driver packages and download instructions.
2. Extract the file using the following command.

   ```
   tar zxvf brocade_driver_<esxversion>_<driverversion>.tar.gz
   ```

3. Power on the vMA virtual machine.
4. Follow instructions from *vSphere Management Assistant Guide* to set DHCP and the password.
5. Log in as *vi-admin*, using the password from Step 4.
6. Copy the adapter driver ISO files appropriate for your adapter to a temporary directory (/tmp) on your vMA system. Following are general command formats for using Putty secure copy (pscp) from windows and secure copy (scp).
   - #pscsp.exe c:\downloads\driver.ISO *user*@host:/tmp/
   - #scp source-filename user@host:/destination-target

7. Run the following command for superuser privileges:

   ```
   # sudo -s
   ```

8. When prompted for the password, enter the superuser account password (same as from Step 4).

9. Add the ESXi server IP Address to vMA using the following command.

   ```
   # vifp addserver <ESXi address>
   ```

   where

   <ESXi address> is the ESXi server's IP Address where driver is to be installed.

10. Run the following command to make sure that the added ESXi server is listed in the vMA.

    ```
    vifp listservers
    ```

11. Execute the following command on the vMA terminal.

    ```
    # vifptarget --set <ESXi IP address/hostname>
    ```

    where

    --set is the Server option.

    <ESXi address> is the ESXi server's IP entered at Step 9.

12. Mount the adapter driver iso file on a temporary directory such as /ISO. Create this directory if does not exist.

    ```
    # mkdir -p /ISO
    # mount -o loop <Brocade Driver ISO file> /ISO
    ```

    As an example for the storage driver (bfa),

    ```
    # mount -o loop
    vmware-esx-drivers-scsi-bfa_400.3.0.0.0-1OEM.468461.iso /ISO
    ```

    As an example for the network driver (bna),

    ```
    # mount -o loop
    vmware-esx-drivers-net-bna_400.3.0.0.0-1OEM.468498.iso /ISO
    ```

13. Scan the ESXi 4.1 host against the driver CD bulletin IDs using the following command.

```
# vihostupdate -s --bundle=<path of driver.zip in mount
location>As an example,
# vihostupdate -s
--bundle=/ISO/offline-bundle/offline-bundle.zip
```

NOTE

Once the target server is set using the **vifptarget** command, you can also run the QLogic installer script on ESXi 4.1 hosts from VMA to extract files and install drivers packages. Refer to “Using the QLogic installer script for ESX 4.1, ESXi 4.1, and ESXi 5.0 systems” on page 158 for details on using installer script commands.

14. Install the driver CD bulletin IDs using the following command.

```
# vihostupdate -i --bundle=<path of driver.zip in mount
location>
```

As an example,

```
# vihostupdate -i
--bundle=/ISO/offline-bundle/offline-bundle.zip
```

15. Repeat steps 10-13 for each adapter driver to be installed.
16. Unmount the adapter driver ISO and delete the temporary “/ISO” directory created in Step 12 using the following commands.

```
# umount /ISO
# rmdir -p /ISO
```

17. After the host updates successfully, exit from maintenance mode.

    Using the vSphere Client, right click ESXi and choose the **Exit Maintenance Mode** option.

18. Reboot ESXi.

    Right-click the ESXi server and select **Reboot**.

NOTE

Be sure to reboot ESXi server where we are installing the driver and not the vMA.

19. After the ESXi server has rebooted, run the following command to make sure the driver is installed. The QLogic driver should appear in the list.

```
# vihostupdate -q
```

Using Image Builder for ESXi 5.0

You can use VMware Image Builder with PowerCLI to customize ESXi 5.0 installations. You can perform the following tasks:

- Add an offline bundle to the image profile.
- Add an online bundle to the image profile.
- Export image profiles to an ISO
- Use image profiles with auto deploy

Add an offline bundle to image profile

You can use Image Builder through PowerCLI to add a downloaded offline bundle to an image profile that can be exported to an installation ISO file or deployed to an online depot. Use the following general steps. For detailed steps, refer to procedures on using vSphere ESXi Image Builder CLI in the vSphere documentation.

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, **VMware ESX/ESXi** in the third column, and then click **Go**.
3. In the Drivers table, click the VMware ESXi Driver Offline Bundle link, and save the offline bundle .zip file to a directory on your system.
4. Initialize PowerCLI on your system.
5. Add the software depot to image profiles as in the following example.

```
Add-EsxSoftwareDepot 'c:\{dir location}\offline-bundle.zip
```

6. Create a clone of the existing profile as in the following example.

```
new-esximageprofile -cloneprofile ESXi-5.0.0-469512-standard
"Brocade_<version>“
```

7. Add the software packages to the new profile as in the following example.

```
add-esxsoftwarepackage -imageprofile Brocade_<version>-GA
-softwarepackage scsi-bfa, net-bna, brocade-esx-bcu-plugin,
hostprofile-bfaConfig
```

8. Perform one of the following steps:

- Export the image profiles to ISO files as in the following example.

```
Export-EsxImageProfile -ImageProfile Brocade_<version>“
-FilePath C:\vsphere5\customimage.iso -ExportToIso
```

- Add auto deploy rules as in the following example.

```
New-DeployRule -Name "Brocade_<version>-GA-Boot" -Item
"Brocade_<version>-GA" -AllHosts
Add-DeployRule -DeployRule "Brocade_<version>-GA-Boot"
```

NOTE

Errors will result in attempts to install the QLogic ESXCLI BCU plugin on ESXi 5.x systems if the systems acceptance level is set higher than “Partner Supported.”

Use image profiles with auto deploy

For details, refer to “Using VMware Auto Deployment to boot QLogic custom images” on page 243.

Using vCLI to install drivers from offline bundles

Use the following steps to install driver packages from VMware offline bundles to ESX and ESXi systems using vCLI.

Refer to “Software installation and driver packages” on page 81 for a description of driver packages and download instructions.

Before performing the following steps, ensure that you have download and installed vCLI. Refer to the VMware vCLI documentation of instructions.

1. Download the adapter driver CD from downloads.vmware.com. Search for “VMware ESXi 5.x driver for Brocade HBAs” (version 3.2.4).

   The driver offline bundle zip file is included in the CD contents as BCD-[bfa/bna]-[release ver]-offline_bundle[build number].zip

2. Copy the offline bundle .zip file to the vCLI host’s /tmp directory.
3. Make sure the host to which you are installing drivers is in maintenance mode.
4. To install the QLogic Adapter software using one of the following methods:

   - For ESX and ESXi 4.1 hosts, use the following command to install an offline bundle.

```
vihostupdate -i -b BCD-[bfa/bna]-[release
ver]-offline_bundle[build numer].zip --server
```

- For ESXi 5.0 hosts, use the following command to install an offline bundle.

  ```
  esxcli --server-server_name> software vib install -d
  BCD-[bfa/bna]-[release ver]-offline_bundle[build
  number].zip
  ```

- For ESXi 5.0 hosts, you can also extract the VIB file from the offline bundle and install from local file system using the following command.

  ```
  esxcli --server-server_name software vib install -v
  [directory path]/[VIB
  file name]
  ```

5. Verify the installation was successful.
   - For ESX and ESXi 4.1 hosts, use the following command.

     ```
     vihostupdate -q --server [IP or hostname]
     ```

   - For ESXi 5.0 hosts, use the following command.

     ```
     esxcli -s -u -p software vib list
     ```

     NOTE

     Use the *--rebooting-image* option to see newly added drivers on the alternate bootbank before you reboot.

6. Reboot the host.
7. Exit maintenance mode.
8. Verify the new driver is installed and loaded using one of the following steps:
   - For ESX and ESXi 4.1 hosts, use the following command.

     ```
     vihostupdate -q --server [IP or hostname]
     ```

   - For ESXi 5.0 hosts, use the following command.

     ```
     esxcli software vib list | grep [bfa|bna]
     ```

Using VMA to install drivers from offline bundles

Use the following steps to install driver packages from VMware offline bundles to ESX and ESXi systems.

Refer to “Software installation and driver packages” on page 81 for a description of driver packages and download instructions.

Before performing the following steps, ensure that you have deployed VMA to an ESX host other than the one where you are installing driver packages. Refer to you VMware VMA documentation for instructions.

1. Download the QLogic adapter driver CD from downloads.vmware.com. Search for “VMware ESXi 5.x driver for Brocade HBAs” (version 3.2.4).

   The driver offline bundle zip file is included in the CD contents as BCD-[bfa/bna]-[release ver]-offline_bundle[build number].zip

2. Copy the offline bundle .zip file to the vCLI host’s /tmp directory or, if loading the .zip file locally from a CDROM, use the following command.

   ```
   mount/dev/cdrom/mnt
   ```

3. Make sure the host to which you are installing drivers is in maintenance mode.

4. Go to directory with the offline bundles or if mounting the VMA CDROM, execute the **mount /dev/cdrom /mnt** command.

5. Install the QLogic Adapter software using one of the following steps:

   - For ESX and ESXi 4.1 hosts, use the following command.

     ```
     vihostupdate -i -b BCD-[bfa/bna]-[release
     ver]-offline_bundle[build numer].zip --server
     ```

   - For ESXi 5.0 hosts, use the following command.

     ```
     esxcli --server-server_name software vib install -d
     BCD-[bfa/bna]-[release ver]-offline_bundle[build
     numer].zip
     ```

6. Verify the installation was successful.

   - For ESX and ESXi 4.1 hosts, use the following command.

     ```
     vihostupdate -q --server [IP or hostname]
     ```

   - For ESXi 5.0 hosts, use the following command:

     ```
     esxcli -s -u -p software vib list
     ```

7. Exit maintenance mode

8. Reboot the host
9. Verify that the new driver is installed and loaded.
   - For ESX and ESXi 4.1 hosts, use the following command:

     ```
     vihostupdate -q --server [IP or hostname]
     ```

   - For ESXi 5.0 hosts, use the following command:

     ```
     esxcli software vib list | grep [bfa|bna]
     ```

Manually install drivers from offline bundles using COS or DCUI

Use the following steps to install drivers from the driver offline bundle to your host system using the VMware Console Operating System (COS) or Direct Console User Interface (DCUI).

Refer to “Software installation and driver packages” on page 81 for a description of driver packages and download instructions.

Before performing these steps, be sure to enable SSH for remote ESX installations and ESXi installations. For local ESX installations, you can mount the CDROM containing the adapter driver CD files.

1. Download the adapter driver CD from downloads.vmware.com. Search for “VMware ESXi 5.x driver for Brocade HBAs” (version 3.2.4).

   The driver offline bundle zip file is included in the CD contents as BCD-[bfa/bna]-[release ver]-offline_bundle[build number].zip
2. Copy the offline bundle .zip file to the vCLI host’s /tmp directory. If loading the .zip file locally from a CDROM, use the following command.

   ```
   mount/dev/cdrom/mnt
   ```

3. Make sure the host to which you are installing drivers is in maintenance mode.
4. Use the following instructions according to your ESXi version.

   For ESXi 4.1, use the following steps for offline bundles.

   a. Install the software using the **esxupdate** command as follows.

      ```
      esxupdate --bundle=/Mount_DIR/ BCD-[bfa/bna]-[release
      ver]-offline_bundle[build numer].zip update
      ```

   b. Verify installation using the **esxupdate** command as follows.

      ```
      esxupdate --query
      ```

For ESXi 5.X, use one of the following steps to install the software, depending on your ESXi version from where you want to obtain a VIB or offline bundle:

- Extract the VIB file from the offline bundle and install from a local file system using the following commands.

  ```
  esxcli software vib install -d [directory path]/[VIB file name]
  ```

- Use the following command to install an offline bundle from an online depot.

  ```
  esxcli --server-server_name software vib install -d [online depot URL]
  ```

- Use the following command to install a VIB from an online depot.

  ```
  esxcli --server-server_name software vib install -v [online depot URL]
  ```

To verify ESXI 5.X installation use the following command.

```
esxcli -s -u -p software vib list
```

5. Exit maintenance mode
6. Reboot the host
7. Verify the new driver is installed and loaded using the following commands.

   ```
   esxupdate --query
   vmkload_mod -l
   ```

Using VMware Update Manager to install Adapter software driver CD

You can install adapter drivers using VMware VSphere Update Manager (VUM) 4.1 and later. Before using the following steps, VUM and the VSphere Client Update Manager plugin must be installed and enabled.

Refer to “Software installation and driver packages” on page 81 for a description of driver packages and download instructions.

1. Download the adapter driver CD from downloads.vmware.com. Search for “VMware ESXi 5.x driver for Brocade HBAs” (version 3.2.4).

   The driver offline bundle zip file is included in the CD contents as BCD-[bfa/bna]-[release ver]-offline_bundle[build number].zip

2. Copy the offline bundle .zip file to the vCLI host's /tmp directory. If loading the .zip file locally from a CDROM, use the following command:

   ```
   mount/dev/cdrom/mnt
   ```

3. Make sure the host to which you are installing drivers is in maintenance mode.
4. Import the offline driver bundle to the Update Manager server using the **Configuration** tab of the **Update Manager > Administration** view (Update Manager client plug-in must be installed).
5. Create a baseline that contains the driver that you are installing on an ESX host. Note the following:
   - For initial installation of an extension, you must use an extension baseline. After installing the extension on the host, you can update the extension module with either upgrade or patch baselines.
   - You can create host extension, patch, and upgrade baselines from the **Baselines** and **Groups** tabs in the **Update Manager > Administration view**.
6. Attach the upgrade or patch baselines to the host you want to remediate. Note the following when performing this task:
   - Attach baselines at the data center, folder, cluster or host level for remediating multiple hosts at once.
   - Attach baselines and baseline groups to objects from the Update Manager **Compliance** view.
7. Scan the container object to view the compliance state of the hosts in the container.
8. (Optional) Stage the extensions from the attached baselines to the ESX/ESXi hosts.
9. Remediate the hosts in the container object against the extension baselines.

   During remediation phase, the Update Manager will first place the host into maintenance mode so you must manually migrate or shut down virtual managers if cluster services are not capable of automated VMware placement. The host will reboot and, after successful installation, the extension or patch should display as compliant.

Upgrading drivers on VMware systems

To update the driver package, simply install the new driver using steps under “Driver installation and removal on VMware systems” on page 157.

NOTE

When upgrading the driver for VMware systems, you must reboot the host system. The new driver is effective after system reboot.

Confirming driver package installation

Adapter driver packages from QLogic contain the current driver, firmware, and HCM agent for specific operating systems. Make sure the correct package is installed for your operating system. Current driver packages are listed under “Software installation and driver packages” on page 81.

An out of date driver may cause the following problems:

- Storage devices and targets not being discovered by device manager or appearing incorrectly in the host’s device manager.
- Improper or erratic behavior of HCM (installed driver package may not support HCM version).
- Host operating system not recognizing adapter installation.
- Operating system errors (blue screen).

NOTE

If the driver is not installed, try re-installing the driver or re-installing the adapter hardware and then the driver.

You can use HCM and tools available through your host’s operating system to obtain information such as driver name, driver version, adapter WWN, adapter PWWNs, firmware name and version, and current BIOS version.

Confirming driver installation with HCM

Following is the HCM procedure to display adapter information.

1. Launch HCM.
2. Select the adapter in the device tree.
3. Select the **Properties** tab in the right pane to display the **Properties** dialog box.

   The dialog box displays adapter properties.

Confirming driver installation with Windows tools

You can use two methods to determine driver installation, depending on your Windows installation: the Driver Verifier and Device Manager.

Driver Verifier Manager

Verify that the adapter storage driver (bfa) is loaded for host bus adapters, CNAs, Fabric Adapters and that the storage driver and network driver (bna) are loaded for CNAs and Fabric Adapters with ports configured in CNA or NIC mode using the Driver Verifier Manager tool (Verifier.exe). The **verifier.exe** command is located in the Windows\System32 folder in Windows Server 2003 systems.

Select the option to display the following information about currently installed drivers:

- Loaded: The driver is currently loaded and verified.
- Unloaded: The driver is not currently loaded, but it was loaded at least once since you restarted the system.
- Never Loaded: The driver was never loaded. This status can indicate that the driver's image file is corrupted or that you specified a driver name that is missing from the system.

Device Manager

Verify if the driver is installed and Windows is recognizing the adapter using the following steps.

1. Open the Device Manager.
   - For CNAs, host bus adapters, and Fabric Adapters, when you expand the list of **SCSI and RAID controllers or Storage controllers an instance of the adapter model should display for adapter port installed.**
   - For CNAs and Fabric Adapter ports configured in CNA or NIC mode, when you expand **Network adapters**, an instance of **QLogic 10G Ethernet Adapter** should also display for each port installed.

   For example, if two two-port CNAs (total of four ports) are installed, four instances of the adapter model display (two under **SCSI and RAID controllers** and two under **Network adapters**). As another example, if only one port on a Fabric Adapter is configured in CNA or NIC mode, two instances of the adapter model display (one under **SCSI and RAID controllers** and one under **Network adapters).**
2. Right-click an instance of your adapter displayed under Device Manager.
3. Select **Properties** to display the **Properties** dialog box.

4. Click the **Driver** tab to display the driver date and version. Click **Driver Details** for more information.

NOTE

If driver is not installed, try re-installing the driver or re-installing the adapter hardware and then the driver.

Linux

Verify that the adapter driver installed successfully using the following commands:

- # rpm -qa|grep -i bfa

  This command prints the names of the QLogic adapter storage driver package (bfa) if installed.

- # rpm -qa|grep -i bna

  This command prints the names of the QLogic adapter network driver package (bna) if installed.

- # lspci

  This utility displays information about all PCI buses in the system and all devices connected to them. **Fibre Channel: QLogic Corporation.** displays for an host bus adapter or Fabric Adapter port configured in HBA mode. **Fibre Channel: QLogic Corporation.** and **Ethernet Controller** display for a CNA or Fabric Adapter port configured in CNA or NIC mode if driver packages have correctly loaded.

- # lsmod

  This command displays information about all loaded modules. If **bfa** appears in the list, the storage driver is loaded to the system. If **bna** appears in the list, the network driver is loaded to the system.

- # dmesg

  This command prints kernel boot messages. Entries for **bfa** (storage driver) and **bna** (network driver) should display to indicate driver activity if the hardware and driver are installed successfully.

Confirming driver installation with Solaris tools

Verify if the driver packages installed successfully using the following commands:

NOTE

BR-804 and BR-1007 adapters are not supported on Solaris systems, so commands in this section do not apply to these adapters.

- These commands display information about loaded kernel modules.

  ```
  modinfo|grep bfa
  modinfo|grep bna
  ```

  If the storage driver package is installed, **bfa QLogic Fibre Channel Adapter Driver** should display.

  If the network driver package is installed, **bna QLogic Fibre Channel Adapter Driver** should display.

- These commands check for and lists the installed storage and network driver package files.

  ```
  pkgchk -nv bfa
  pkgchk -nv bna
  ```

- This command displays all available information about software packages or sets that are installed on the system.

  ```
  pkginfo -l
  ```

  The storage driver package is installed, bfa_pkg should display with a “complete” install status in the list of installed packages.

Following is an example for Solaris 10 systems:

```
PKGINST:  bfa
      NAME:  QLogic Fibre Channel Adapter Driver
  CATEGORY:  system
      ARCH:  sparc&i386
   VERSION:  alpha_bld31_20080502_1205
   BASEDIR:  /
    VENDOR:  QLogic
      DESC:  32 bit & 64 bit Device driver for QLogic Fibre
Channel adapters
    PSTAMP:  20080115150824
  INSTDATE:  May 02 2008 18:22
   HOTLINE:  Please contact your local service provider
    STATUS:  completely installed
```

Following is an example for Solaris 11 systems:

```
-bash-4.1# pkginfo -i  bfa
system      bfa QLogic Fibre Channel Adapter Driver
-bash-4.1# pkgchk -nv  bfa
/opt
/opt/brocade
/opt/brocade/adapter
/opt/brocade/adapter/bfa
/opt/brocade/adapter/bfa/bfa_drv_arc.tar
-bash-4.1# pkginfo -i  bna
system      bna Brocade Network Adapter Driver
-bash-4.1# pkgchk -nv  bna
/opt
/opt/brocade
/opt/brocade/adapter
/opt/brocade/adapter/bna
/opt/brocade/adapter/bna/bna_drv_arc.tar
-bash-4.1#
```

Confirming driver installation with VMware tools

Verify if the driver installed successfully using the following commands:

- The following commands print the names of the Brocade storage driver (bfa) if installed.
  - For ESX 4.1 systems

    ```
    # rpm -qa|grep -i bfa
    ```
  - For ESXi 5.X systems

    ```
    esxcli software vib list | grep bfa
    ```

- These commands print the names of the Brocade network driver (bna) if installed.
  - For ESX 4.1 systems

    ```
    # rpm -qa|grep -i bna
    ```
  - For ESXi 5.X systems

    ```
    esxcli software vib list | grep bna
    ```

- This command lists loaded modules.

  ```
  esxcfg-module -l
  ```

  For the storage driver, verify that an entry for **bfa** exists and that the ID loaded.

  For the network driver, verify that an entry for **bna** exists and that the ID loaded.

- This command displays the latest versions of installed drivers for ESX 4.1 systems.

  ```
  cat /proc/vmware/version
  ```

  For the storage driver, verify that an entry for **bfa** exists.

  For the network driver, verify that an entry for **bna** exists.

- This command displays the latest versions of installed drivers for ESXi 5.X systems.

  ```
  esxcli software vib list | grep -i brocade
  ```

- This displays the driver package name, version, vendor (Brocade) and release date using vSphere ESXi Image Builder CLI for ESXi 5.X.

  ```
  Get-EsxSoftwarePackage
  ```

- This utility displays information about all PCI buses in the system and all devices connected to them. **Fibre Channel: QLogic Corporation.** displays for an host bus adapter or Fabric Adapter port configured in HBA mode. **Fibre Channel: QLogic Corporation.** and **Ethernet Controller** display for a CNA or Fabric Adapter port configured in CNA or NIC mode if driver packages have correctly loaded.

  ```
  # lspci
  ```

- This command displays information about all loaded modules. If **bfa** appears in the list, the storage driver is loaded to the system. If **bna** appears in the list, the network driver is loaded to the system.

  ```
  # lsmod
  ```

- This command prints kernel boot messages. Entries for **bfa** (storage driver) and **bna** (network driver) should display to indicate driver activity if the hardware and driver are installed successfully.

  ```
  # dmesg
  ```

- These commands display the location of the driver modules if loaded to the system:

  The following command displays the storage driver module location. The module will have a **bfa** prefix.

  ```
  # modprobe -l bfa
  ```

  The following command displays the network driver module location. The module will have a **bna** prefix.

  ```
  # modprobe -l bna
  ```

Verifying adapter installation

Problems with adapter operation may be due to improper hardware or software installation, incompatibility between the adapter and your host system, improper configuration of the host system, unsupported SFP transceivers installed (stand-up adapters only), an improper cable connected from adapter to the switch (stand-up adapters only), or an adapter is not operating within specifications. Determine if problems exist because of these factors by verifying your installation with information located in the following chapters in this manual.

- “Product Overview” on page 1.

  This includes hardware and software compatibility information. This chapter also describes software installation packages supported by host operating system and platforms.

- “Hardware Installation” on page 95.

  This chapter provides hardware installation instructions.

- Software Installation

  This chapter provides software installation instructions.

- Specifications

  This chapter describes product specifications.

Following is a list of general items to verify during and after installation to avoid possible problems. Verify the following and make corrections as necessary.

- Make sure that the adapter is correctly installed and seated in the connector in the host system slot or connector. Press firmly down on the top of the adapter to make sure it has seated in the connector. Check your system hardware manual and Fabric Adapter “Hardware compatibility” on page 5, CNA “Hardware compatibility” on page 15, or host bus adapter “Hardware compatibility” on page 25 to verify that you installed the adapter in the correct slot.
- Make sure that the correct driver package for the host operating system and platform is properly installed.
- If the host system requires special configuration to enable adapters, adapter connectors, and interrupt request (IRQ) levels, verify these options in the system BIOS menu and in your system documentation.
- Make sure that all Fibre Channel devices connected through the adapter and associated FCoE or Fibre Channel switch are correctly connected, powered up, and operating correctly. If not powered up, devices will be unavailable.
- Verify host system storage, switch, and operating system compatibility.
- Verify the following for stand-up adapters only:
  - ❑ Observe LED operation on adapter and refer to the “Adapter LED operation (stand-up adapters)” on page 274 for Fabric Adapters, “Adapter LED operation (stand-up adapters)” on page 293 for CNAs, and “Adapter LED operation (stand-up adapters)” on page 283 for host bus adapters. LEDs are visible through the adapter’s mounting bracket.

If LEDs indicate that the link between the adapter and switch is not operational, this could mean that a problem on the link between the switch and adapter or that the driver is not loaded and communicating with the switch.

- ❑ The adapter is installed in the appropriate connector in the host system.
- ❑ All small form factor pluggable (SFP) optic transceivers are correctly installed, seated, and latched in adapter SFP transceiver receiver slots.
- ❑ Cables are properly connected to the appropriate adapter port and seated in the SFP transceiver connector.
- ❑ Correct options are configured for the slot where the adapter is installed,

■ Verify the following for mezzanine adapters only:

- ❑ The blade server or server blade is turned on.
- ❑ The adapter is installed in the appropriate connector. On some blade servers or server blades, connectors may only support a specific adapter type. Refer to your blade sever documentation for help.
- ❑ Whether the blade server or server blade on which the adapter is installed is correctly configured and installed in the blade system enclosure. Refer to your blade server and blade system enclosure documentation for help.
- ❑ Any modules or blades in that support adapter operation are installed in the appropriate enclosure bays and correctly configured. Refer to the documentation for your blade system enclosure for help.
- ❑ The blade system enclosure is configured for adapter operation. Refer to your blade system enclosure and documentation for blade system enclosure components for help.
- ❑ You are using the latest device drivers, firmware, and BIOS for the blade server (or server blade) and other components in the blade system enclosure that support adapter operation.

Installing SNMP subagent

Simple Network Management Protocol (SNMP) is supported by CNAs and by Fabric Adapters for ports configured in CNA or NIC mode. For more information, refer to “Simple Network Management Protocol” on page 67. QLogic BR-Series Adapter SNMP is supported through an extension to the SNMP master agent, called the subagent, which processes SNMP queries for QLogic BR-Series Adapters. The subagent is only supported on Linux and Windows systems. SNMP subagent files are copied to your host system when you install adapter management utilities through HCM and the QLogic Adapter Software Installer (QASI).

Windows systems

For Windows systems, use the following steps.

1. Go to the following directory where the SNMP files are installed.

   c:\program files\brocade\adapter

2. Enter one of the following commands:

   - brocade_install.bat SNMP=TRUE

     Installs the SNMP subagent, drivers, and other utilities.

   - brocade_install.bat SNMP_ONLY=TRUE

     Installs only the SNMP subagent.

3. Start SNMP services using the following steps.

   a. Open Services (typically **Start>Control Panel>Administrative Tools>Services**)

   b. Right-click **SNMP** and select **Start.**

Linux systems

1. Go to the following directory where the subagent files are installed.

   /opt/brocade/adapter

2. For RHEL, OL, and SLES systems, enter one of the following commands:

   - Enter **Linux_driver_install.sh - -snmp** to install the SNMP subagent, drivers, and other utilities.

   - Enter **Linux_driver_install.sh - -snmp-only to** install the SNMP subagent only

3. Start SNMP services using the following commands.

   - service <snmpd> start

This starts the master agent “snmpd” service if it is not already running.

- service <bnasd> start

  This starts the subagent “bnasd” service.

Updating drivers with HCM

You can update installed drivers on connected hosts using the **Adapter Software** dialog box in HCM. Updating the driver updates all of the following components to the latest versions:

- Network and storage driver
- HCM Agent
- initrd file (Linux systems)

To update drivers with HCM, use the following steps:

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the **Drivers** link at the top of the page to direct you to the driver packages.
4. Locate the driver package for your adapter in the table, click on it, and then follow the directions.
5. Select a host on the device tree, and then select **Adapter Software** under the **Configure** menu.

   The **Adapter Software** dialog box displays.
6. Enter the filename of the updated driver in the **Driver File** text box.

   OR

   Click the **Browse** button and navigate to the location of the driver file to update.
7. Select **Start Update**.

   The selected file downloads. If an error occurs during the downloading process, an error message displays.
8. Review the installation progress details that display in the dialog box to determine if the files install successfully.

NOTE

- This feature upgrades existing software installed on the host system. Downgrades are not supported.
- During installation, dialog boxes validate installation success. Since the Solaris and VMware ESX Server operating systems require a reboot for the driver update to take effect, successful installation is not validated in the dialog boxes.
- It is recommended that you put VMware ESX hosts in maintenance mode during installation procedures, as since a system reboot is required after installation. Driver upgrade using HCM is not supported for VMware ESXi servers. Refer to "Using software installation scripts and system tools" on page 138 for VMware procedures.

Installing HCM to a host from the HCM Agent

You can install HCM to any host system from a functioning HCM Agent on a server system. The following are prerequisites for the server system:

- The adapter and driver package must be installed.
- The HCM agent must be running.

Use the following steps to install HCM:

1. Enter the following URL into your host system's web browser:

   `https://server-host:34568/index.html`

   where:

   `server-host`—Is the IP address of a server system with the QLogic adapter and driver installed and HCM Agent running.

   `34568`—the TCP/IP port where the HCM Agent communicates with HCM.

2. Respond to prompts as required during HCM installation, and the HCM GUI will launch.
3. Log in to HCM when prompted.

To launch HCM in the future, use the HCM shortcut icon. On Windows, the shortcut is located under **Start menu** > **Brocade** > **Host Connectivity Manager**. For Solaris, launch HCM from the command prompt using the following command.

```
sh /opt/brocade/fchba/client/Host_Connectivity_Manager
```

HCM Agent operations

This section outlines the conditions requiring you to restart the HCM Agent describes host operating system commands for controlling agent operation.

HCM agent restart conditions

The following conditions require that you restart the HCM Agent if HCM is already active.

- An adapter is installed in the system when no adapters are currently installed and HCM is active.
- The PCI hot plug feature is activated when adding new adapters and HCM is active.
- For Windows systems, the Adapter is disabled through Device Manager while HCM is active, and then the device is enabled through Device Manager.

HCM agent commands

Commands for controlling HCM operation are grouped in the following categories under the host operating system.

- Verifying that the HCM Agent is running
- Starting the agent
- Stopping the agent
- Changing the agent's default communication port

NOTE

The HCM Agent will not start automatically if it stops unexpectedly during operation. You must restart the agent.

Linux and VMware systems

Adapter management through the HCM Agent is only supported on ESX 4.1 systems. For ESXi 4.1, 5.0, and 5.1 systems, HCM management is through the ESXi Management Feature when CIM Provider is installed on these systems. Refer to "HCM and BNA support on ESXi systems" on page 75.

Use the following commands:

- Determining agent operation.

```
/usr/bin/hcmagentservice status
```

- Starting the agent (agent will not restart if system reboots or agent stops unexpectedly).

  ```
  /usr/bin/hcmagentservice start
  ```

- Starting the agent (agent restarts if system reboots).

  ```
  chkconfig –-add hcmagentservice
  ```

- Stopping the agent.

  ```
  /usr/bin/hcmagentservice stop
  ```

- Stopping the agent from restart after system reboots.

  ```
  chkconfig –-del hcmagentservice
  ```

- Changing the default communication port. Use the following steps.

  1. Change to the agent installation directory (default is /opt/brocade/adapter/hbaagent/conf).
  2. Edit abyss.conf to change the entry “SecurePort 34568” to any other nonconflicting TCP/IP port (for example, SecurePort 4430).

Solaris systems

Use the following commands:

- Determining agent operation

  ```
  svcs hcmagentservice
  ```

- Starting the agent (agent will not restart if system reboots or agent stops unexpectedly)

  ```
  svcadm enable -t hcmagentservice
  ```

- Starting the agent (agent restarts if system reboots)

  ```
  svcadm enable hcmagentservice
  ```

- Stopping the agent

  ```
  svcadm disable -t hcmagentservice
  ```

- Stopping the agent from restart after system reboots

  ```
  svcadm disable hcmagentservice
  ```

- Changing the default communication port
  1. Change to the agent installation directory (default is /opt/brocade/adapter/hbaagent/conf).
  2. Edit abyss.conf to change the entry “SecurePort 34568” to any other nonconflicting TCP/IP port (for example, SecurePort 4430).

Windows systems

Use the following options:

- Determining agent operation
  1. Run the `services.msc` command to display the **Services** window.
  2. Right-click **Brocade HCM Agent Service** and select **Status**.
- Starting the agent (agent will not restart if system reboots or agent stops unexpectedly)
  1. Run the `services.msc` command to display the **Services** window.
  2. Right-click **Brocade HCM Agent Service** and select **Start**.
- Starting the agent (agent restarts if system reboots)
  1. Run the `services.msc` command to display the **Services** window.
  2. Right-click **Brocade HCM Agent Service** and select **Start**.
  3. Right-click **Brocade HCM Agent Service** and select **Properties**.
  4. Select the **Automatic** option in **Startup type**.
  5. Click **OK**.
- Stopping the agent
  1. Run the `services.msc` command to display the **Services** window.
  2. Right-click **Brocade HCM Agent Service** and select **Stop**.
- Stopping the agent from restart after system reboots
  1. Run the `services.msc` command to display the **Services** window.
  2. Right-click **Brocade HCM Agent Service** and select **Stop**.
  3. Right-click **Brocade HCM Agent Service** and select **Properties**.
  4. Select the **Manual** option in **Startup type**.
  5. Click **OK**.

- Changing the default communication port
  1. Change to the agent installation directory (default is c:/opt/brocade/adapter/hbaagent/conf).
  2. Edit abyss.conf to change the entry “SecurePort 34568” to any other nonconflicting TCP/IP port (for example, SecurePort 4430).

HCM configuration data

HCM configuration data is compatible between versions 3.2.x.x, 3.0.x.x, 2.3.x.x, 2.2.x.x, 2.1.x.x, 2.0, 1.1.x.x, and 1.0. Configuration data backed up when prompted during software removal with the Adapter Software Uninstaller and when using the HCM **Backup Data** dialog box includes the following:

- Adapter application data
- HCM user data
- Alias data
- Setup discovery data
- Syslog data
- HCM logging data
- Support save data

Backing up configuration data

Use the HCM **Backup Data** dialog box to back up configuration data before removing HCM. Also, be sure to back up data when the backup message displays when removing software with the Adapter Software Uninstaller.

Following are default locations for HCM configuration data:

- Versions 1.1.0.8 and above - <user home>\HCM\data
- Versions 1.1.0.6 and below - <installation location>\FC HBA\data

Restoring configuration data

Follow these guidelines when restoring configuration data backed up during software removal or with the **HCM Backup Data** dialog box:

- For HCM 2.0 and earlier, you can only restore data that you backed up during software removal when you are prompted to restore data during software installation.
- For HCM 2.0 and later, you can restore data when prompted to do so during software installation or by using the HCM **Restore Data** dialog box.

Setting IP address and subnet mask on CNAs

After installing a CNA or Fabric Adapter with ports configured in CNA or NIC mode, you must assign an IP address and subnet mask to function on a DCB network. Work with your network administrator to obtain the correct address and mask for your network.

Windows

1. From **Control Panel**, select **Network Connections**.
2. Right-click the installed “QLogic Ethernet XX” Network Adapter Interface instance and click **Properties**.
3. In the **This connection uses the following items** box, click **Internet Protocol (TCP/IP)**, and then click **Properties**.
4. Select **Use following IP address radio button,** and configure the IP address and subnet mask.
5. Click **OK** to apply the configuration.

Linux

Following is an example for using the **ifconfig** command to set the IP address and subnet mask. Note that a CNA and a Fabric Adapter with ports configured in CNA or NIC mode are typically named “eth0.”

```
ifconfig eth0 193.164.1.10 netmask 255.255.255.0 up
```

VMware

Please refer to ESX/ESXi configuration guide on network configuration for VMware ESX/ESXi 4.1 and 5.0.

4 Boot Code

Boot support

Boot support is provided for QLogic BR-Series Adapters installed on your host.

To note changes to boot support and procedures detailed in this chapter, please download the current release notes for your adapter software version from the QLogic Web Site using the following steps:

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the **Drivers** link at the top of the page to direct you to the driver packages.
4. Locate the driver for your adapter in the table, and then click on the release notes link.

The following system BIOS and platforms support QLogic BR-Series Adapters:

- PCI BIOS 3.1 and PCI firmware 3.0 or later for QLogic Fabric Adapters and CNAs.
- BIOS

  Boot code for x86 and x86_x64 platforms. Compliant with PCI BIOS 3.1 or later and PCI Firmware 3.0 or later.
- Unified Extensible Firmware Interface (UEFI)

  Boot code for UEFI systems
- PXE (preboot execution environment) and UNDI (universal network device interface)

  Network boot support for x86 and x86_x64 platforms.

A single, updatable boot code image, stored in the adapter option read-only memory (option ROM) memory, contains all boot code for supported host platforms.

NOTE

By default, BIOS and UEFI are enabled on adapter ports for boot over SAN.

Boot code updates

The adapter boot code contains the following:

- PCI BIOS 2.1 and PCI firmware 3.0 or later for QLogic Fabric Adapters and CNAs.
- BIOS

  Boot code for x86 and x86_x64 platforms. Compliant with PCI BIOS 2.1 or later and PCI Firmware 3.0 or later.
- Unified Extensible Firmware Interface (UEFI)

  Boot code for UEFI systems
- Adapter firmware

Update the adapter with the latest boot code image for installed BR-Series Adapters from the QLogic Web Site using the following steps.

1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
3. Click the **Boot Code** link at the top of the page to direct you to the boot code packages.
4. Locate the boot code package for your adapter in the table, click on it, and then follow the directions.

Update the boot code image file to the adapter installed on your host system using the Host Connectivity Manager (HCM) and BCU commands. Although BCU updates the file from the host's local drive, you can use HCM to update from a remote system.

NOTE

Starting with Adapters v3.2.3.0 and later, that patch versions of adapter driver firmware will be available in boot code for updating installed adapters.

All QLogic BR-Series Adapters installed in a host system must use the same boot code version.

To keep drivers and boot code synchronized, be sure to update your adapter with the latest boot image after you install or update adapter driver packages. Be sure to update drivers before updating the boot code.

You can determine the current BIOS version installed on your adapter using the following methods:

- View the BIOS that displays on your system screen during hardware reinitialization, just before you are prompted to press CTRL-B or ALT+B to enter the BIOS Configuration Utility.
- Enter the **bcu adapter --query** command. The installed BIOS version displays in the Flash Information section of the command output.
- View the adapter **Properties** panel in HCM. To view the panel, select the adapter in the d-01evice tree, and then click the **Properties** tab in the right pane.
- If the system supports UEFI, verify the installed BIOS version through the UEFI system BIOS setup menu.

For servers with operating system and QLogic BR-Series Adapter drivers installed, you can use BCU commands or HCM directly to update boot code on adapters.

NOTE

If updating v1.1.x.x or v2.x boot code installed on BR-825, BR-815, and BR-804 HBAs to v3.0 or later, refer to “Updating older boot code on HBAs” on page 192.

For servers without a hard disk or operating system that have an installed adapter, you can download Linux LiveCD ISO images or create WinPE ISO images to boot the server, and then use BCU commands to update the boot code. For instructions on using these ISO images, refer to “Boot systems over SAN without operating system or local drive” on page 240.

Updating boot code with HCM

Follow these steps to upgrade adapter flash memory with the latest boot code.

NOTE

Updating boot code through HCM is not supported on VMware ESXi servers. Use the BCU **boot - -update** command instead. Refer to "Updating boot code with BCU commands" on page 192.

1. Download the boot code image zip file (brocade_adapter_boot_fw_*version*.zip) from the QLogic Web Site using the following steps:
   a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
   b. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
   c. Click the **Boot Code** link at the top of the page to direct you to the boot code packages.
   d. Locate the boot code package for your adapter in the table, click on it, and then follow the directions.
2. Extract the boot code image file.
3. Launch HCM.
4. Select a host on the device tree, and then select **Adapter Software** from the **Configure** menu.

   The **Adapter Software** dialog box displays.
5. Enter the filename of the boot image in the **Boot Image File** text box.

   OR

   Click the **Browse** button and navigate to the location of the file to update.
6. Click **Start Update**.

   The selected file downloads. If an error occurs during the downloading process, an error message displays.
7. Review the installation progress details that display in the dialog box to determine if the files install successfully.
8. Reboot the system.

Updating boot code with BCU commands

Use the following procedure to update boot code using BCU commands.

1. Download the boot code image zip file (brocade_adapter_boot_fw_*version*.zip) from the QLogic Web Site to a folder on your local drive using the following steps:
   a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
   b. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
   c. Click the **Boot Code** link at the top of the page to direct you to the boot code packages.
   d. Locate the boot code package for your adapter in the table, click on it, and then follow the directions.
2. Extract the boot code image file.
3. Enter the following BCU command:

   `bcu boot --update` *`image file`* `-a`

   where:

   `ad_id`—ID of the adapter (adapter)

   `image file`—Name of firmware image file

   `-a`—Indicates that the boot code should be updated on all installed QLogic BR-Series Adapters found on the host. Note that the adapter identification (ad_id) should not be specified if the -a option is specified.

Updating older boot code on HBAs

If updating v1.1.x.x or v2.x boot code installed on BR-825, BR-815, and BR-804 HBAs to v3.0 or later, download and use a LiveCD image to update boot code. If you do not do this, a “version mismatch” error may display after you reboot the server with 3.x drivers installed. Follow instructions under “Using a LiveCD image” on page 241 through the step to update the adapter boot code.

Network boot

The Network or the preboot execution environment (PXE) boot feature allows a host to boot its operating system from a system located somewhere on the Ethernet LAN instead of the host's local disk or over the SAN. Booting from a remote LAN location provides the obvious advantage of recovering quickly from a host or adapter malfunction. With PXE BIOS enabled on the CNA ports or Fabric Adapter ports configured in CNA or NIC mode, replacing an old host with a new one involves installing the adapter from the old host into the new one with the same configuration, and then booting the new host. The host's operating system automatically boots from the remote LAN device.

Although fast recovery from a malfunction is a big advantage, following are considerations for the host and adapter, depending on the replacement situation:

- Even though you install a similar host, the new host may require unique System BIOS options and other settings, or internal IDE drives may need to be disconnected or disabled to initiate a network boot.
- If replacing the QLogic BR-Series Adapter in a host with a similar QLogic BR-Series Adapter, you will need to reconfigure the adapter to boot from the appropriate remote boot device.
- If replacing a host with a different model, you may be prompted to install the adapter driver for the existing adapter.

Booting servers over the network can significantly streamline server administration and facilitate server deployment. Instead of manually configuring each individual server, boot images on LAN-based systems can be cloned and assigned to groups of servers at the same time. This not only simplifies initial configuration, but makes ongoing software updates and maintenance much easier to administer. When boot images are centrally managed on the network, server security, integrity, and ability to recover data are also enhanced.

Following are additional benefits of booting over the network:

- Disaster recovery.
- More control and efficiency for software distribution.
- Booting diskless systems such as thin clients and dedicated systems.
- Automating system maintenance such as backups.
- Automating system checking such as virus scanning.
- Ensuring security where a guaranteed secure system is needed.
- Centralized storage management and administration of client workstations.
- Increased host reliability.
- Improved security.

BIOS support for network boot

The PXE mechanism, embedded in the adapter firmware, provides the ability to boot the host operating system from a remote system located on the Ethernet LAN instead of the over the SAN or from the host's local disk. UNDI (universal network device interface) is an application program interface (API) used by the PXE protocol to enable basic control of I/O. It performs other administrative chores like setting up the MAC address and retrieving statistics through the adapter. UNDI drivers are embedded in the adapter firmware.

When PXE boot or PXE BIOS is enabled, the following occurs to execute the system boot process:

- The PXE client (or adapter) uses the Dynamic Host Configuration Protocol (DHCP) protocol to obtain information on available PXE boot servers on the network, such as the IP addresses, from a DHCP server.
- The client contacts the appropriate boot server and obtains the file path for a network bootstrap program (NBP).
- The client downloads the NBP into the system's RAM using Trivial File Transfer (TFTP), verifies it, and finally executes it.
- The PXE protocol sets the proper execution environment, such as availability of basic network IO services and areas of client memory, and then transfer control to the NBP.
- The NBP loads other files, such as configuration files and executable files. This action can run diagnostics, execute firmware update utilities, or boot an entire operating system over the network.

The PXE boot client is implemented in the adapter firmware. It supports legacy BIOS for servers that do not support UEFI or UEFI for the newer servers. The Client PXE code provides the following services for use by BIOS or a downloaded NBP.

- Preboot Services API

  This provides several global control and information functions.

- TFTP API

  The TFTP (Trivial File Transfer Protocol) API enables opening and closing of TFP connections and reading packets from and writing packets to a TFTP connection. The PXE client downloads the PXE boot loader from an TFTP server.

- UDP API

  The User Datagram Protocol (UDP) API enables opening and closing of UDP connections and reading packets from and writing packets to a UDP connection.

- UNDI API

  The Universal Network Device Interface (UNDI) API enables basic control of I/O through the adapter. This allows the use of universal protocol drivers that can be used on any network interface that implements this API. UNDI is used by the PXE protocol to enable basic control of I/O and performs other administrative chores like setting up the MAC address and retrieving statistics through the adapter.

The PXE BIOS Configuration Utility, embedded with the adapter boot code for legacy BIOS support, UEFI setup screens, BCU commands, and HCM allow you to perform the following tasks:

- Enable or disable BIOS.

  When enabled, the system BIOS can execute the BIOS code for a specific adapter port for PXE boot over the network.

- Set a VLAN ID to be used during network boot for the specific port.

Refer to “Configuring network boot” on page 196 for details.

Driver support for network boot

Refer to “Boot installation packages” on page 88. Table 1-11 on page 91 for applicable DUDs for supported operating systems. Notes following the table identify DUDs that support network boot. Consider the following about network driver support for different operating systems:

- Linux (RHEL)

  For supported versions earlier than RHEL 5.7, the nw (network) drivers ISO file supports network (PXE) boot. Install these drivers after the fc (Fibre Channel storage) ISO file. For RHEL 5.7 and later, network drivers and storage drivers are part of a single ‘unified” ISO package.

- Linux (SLES)

  Network and storage drivers are part of a single ISO package.

- VMware ESX

  Network and storage drivers are part of a single ISO package.

Host system requirements for network boot

Consider these requirements for your host system when configuring network boot:

- You may need to disconnect internal IDE hard drives to disable them in the system BIOS and allow the adapter boot BIOS to boot from the remote system. Some systems may allow these drives to be enabled in the system BIOS if they correctly support the bootstrap protocol.
- Typically, the boot order must be CD-ROM, diskette, and then remote boot system. After the operating system installs, you can change this order if desired.

Due to the variety of configurations and variables in a LAN installations, your specific environment must determine any additional requirements to guide installation and configuration for best results.

Configuring network boot

Configure network or PXE Boot on the adapter using the following methods:

- “Using the PXE BIOS Configuration Utility” on page 197.
- “Using UEFI setup screens” on page 199.
- “Using HCM or BCU commands” on page 200.

Using the PXE BIOS Configuration Utility

When using legacy BIOS systems or boot mode, use the following procedures to configure network boot using the PXE BIOS Configuration Menu.

NOTE

When you change a setting on a BIOS Configuration Utility screen, the setting is saved to the adapter whenever you change to a new screen or close the utility.

1. Power on the host system.
2. Watch the screen as the system boots. When “PXE 2.1 BIOS 2010-11 All rights reserved” displays, press ALT+B or CTRL+B.

   The **PXE BIOS Configuration Menu** displays a list of installed adapter ports, similar to that shown in Figure 4-1.

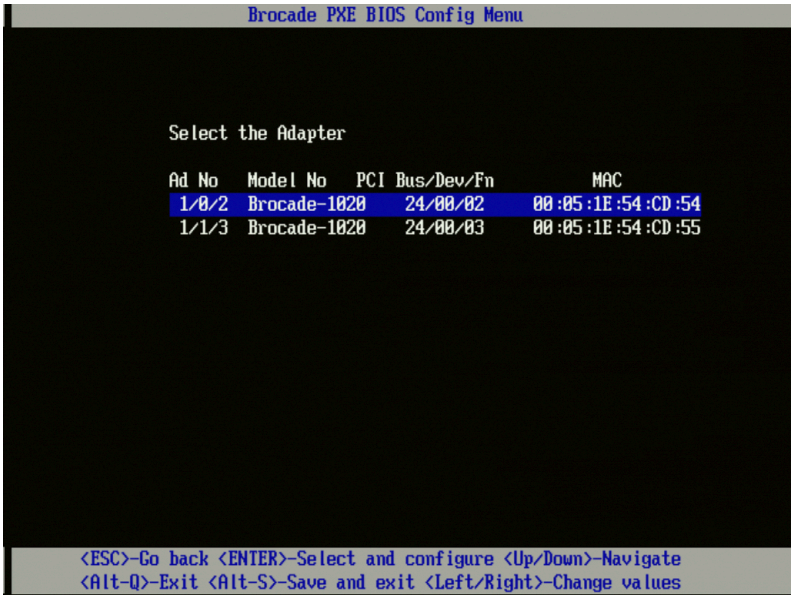


Figure 4-1. PXE BIOS Configuration Menu (Select the Adapter)

Under the **Ad No** column, 1/0/2 and 1/1/3 are the first port and second port respectively on the first installed adapter. Note that 2/0/2 and 2/1/3 would be the first and second ports on a second installed adapter.

The Configuration Utility supports a maximum of 16 ports, and 8 ports can display on a screen at a time. Select **Page Up** to go to a previous screen or **Page Down** to go to the next screen.

NOTE

To bypass functions and stop loading BIOS, you must to press X or **x** for each port. Press X within 5 seconds to bypass execution of functions displayed on screens. If you press X after 5 seconds, the next function (instead of current function) will be bypassed. **X** skips the whole BIOS option ROM whereas **x** skips a specific function's option ROM.

3. Select a CNA port or and Fabric Adapter port configured in CNA or NIC mode that you want to configure.

   A screen similar to Figure 4-2 displays showing the port's current BIOS version, MAC address, and BIOS settings.

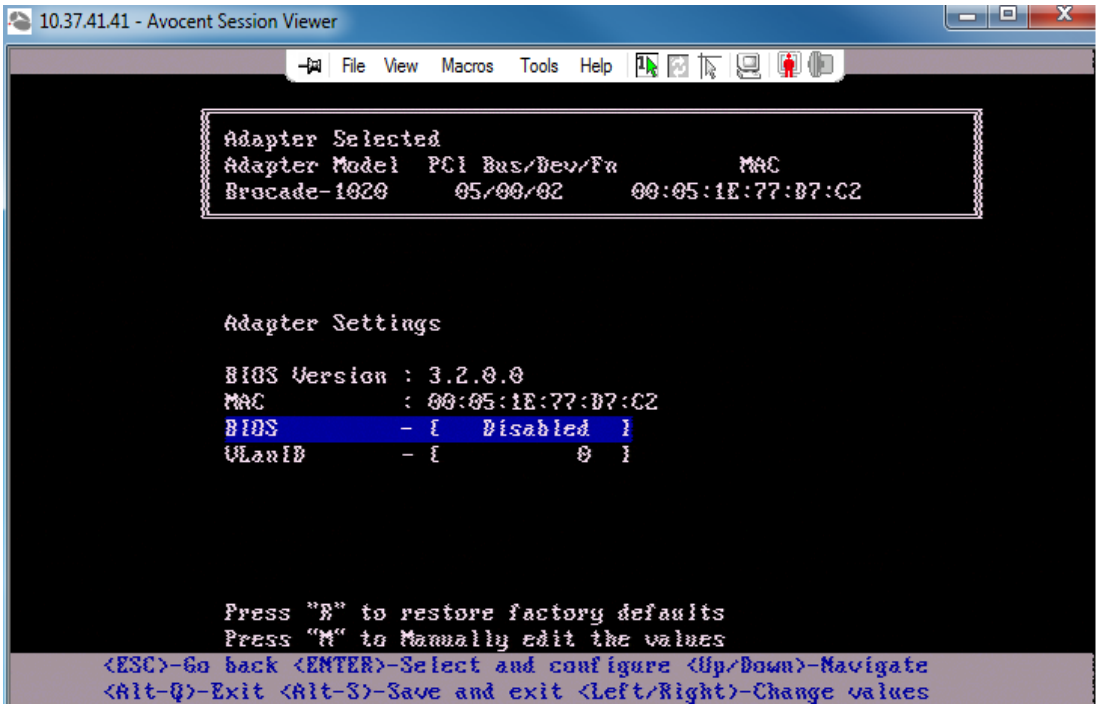


Figure 4-2. PXE BIOS Configuration Menu (Adapter Settings)

Change any parameters by following the instructions at the bottom of the BIOS Configuration Utility screen. For example, use the following keys to select and change information:

- Up and Down keys - Scroll to a different field.
- ENTER - Select a field and configure values.
- Left and Right arrow keys - Change a value.

- ALT-S - Save configuration values to adapter flash memory.
- ALT-Q - Exit the utility.
- ESC - Go back a screen.
- Page Up or Page Down - Go to preceding or next screen.

NOTE

To restore factory default settings, press R.

1. Configure the following settings as required:
   - Enable or disable BIOS to support network boot.

     You must enable BIOS to support network boot for an adapter port. If disabled, the host system cannot boot from a network system. The default state for Adapter ports is disabled.
   - Enter a VLAN ID for the port to be used during network boot. Enter a value from 0 through 4094.
2. Save or exit the configuration utility.
   - To save the configuration, press the **Alt** and **S** keys.
   - To exit without saving press the **Alt** and **Q** keys.

Using UEFI setup screens

When using UEFI systems or boot mode, use these general steps to configure PXE boot using your system UEFI setup screens. Note that this section only provides general steps for configuring network boot. Refer to your system's documentation or online help for details on using your system's UEFI setup utility.

NOTE

When you change a setting on a UEFI setup screen, the setting is saved to the adapter whenever you change to a new screen within the adapter configuration or close the utility. Changes are effective even before you explicitly save them.

1. Power on the host system.
2. Access your system setup, hardware setup, or hardware management menus. Depending on your system, you may access these menus by booting the system and pressing the **F2** key (Dell systems) or **F1** key (IBM systems) when prompted for configuration or setup.

3. Access screens for system setup (Dell systems) or system settings (IBM systems).
4. Select the QLogic CNA or Fabric Adapter with port configured in CNA or NIC mode that you want to configure.
5. Access the Port Configuration screen for the port. Note the following:
   - On IBM systems, port selection and port configuration will be available under a Network menu option.
   - QLogic CNA ports or Fabric Adapter ports configured in CNA or NIC mode appear as individual network interface cards (NIC) to your host system.
6. Access NIC Configuration options.
7. Configure the following options.
   - Enable PXE boot.
   - Enter a VLAN ID for the port to be used during network boot. Enter a value from 0 through 4094.
8. If you wish to display and configure settings such as IP address and subnet mask, access the network settings page for the port NIC device.
9. Save your settings and exit the setup utility.

Using HCM or BCU commands

You can enable or disable PXE BIOS on a specific adapter port for booting over the network and configure a VLAN ID for the port to be used during network boot using HCM dialog box options and BCU commands,

Configuring PXE BIOS using HCM

To configure BIOS using HCM, perform the following steps.

1. Select one of the following in the device tree.
   - CNA
   - CNA port
   - Fabric Adapter port configured in CNA or NIC mode
2. Select **Configure > Basic Port Configuration** to display the **Basic Port Configuration** dialog box.
3. Select the **PXE Boot** tab to display network boot parameters.

4. Perform any or all of the following actions as appropriate for your needs:
   - Click the **PXE Boot enable** check box to enable or disable BIOS.

     You must enable BIOS to support network boot for an adapter port. If disabled, the host system cannot boot from network systems. The default setting for the adapter boot BIOS is disabled.
   - Enter a VLAN ID between 0 through 4094 for the port to be used during network boot
5. Click **OK** to exit and save values.

All configuration values are stored to adapter flash memory.

For details in using HCM options to enable BIOS for network boot, refer to the instructions for configuring PXE boot support using HCM in the Host Configuration chapter of the *QLogic BR Series Adapter Administrator's Guide*.

Configuring PXE BIOS using BCU commands

You can use BCU commands to configure PXE BIOS for the following:

- CNA port
- Fabric Adapter port configured in CNA or NIC mode

Use BCU commands for the following tasks:

- Enable BIOS for PXE boot

  You must enable BIOS to support network boot for an adapter port. If disabled, the host system cannot boot from network systems. The default setting for the adapter boot BIOS is disabled. We recommend to only enable one adapter port per host to boot over the network.

  `bcu ethboot --enable` *`port_id`*

  where:

  `port_id`—Specifies the ID of the port for which you want to set network boot attributes. This could be the adapter_id/port_id, port PWWN, port name, or port hardware path.
- Disable BIOS for PXE boot:

  `bcu ethboot --disable` *`port_id`*

  where:

  `port_id`—Specifies the ID of the port for which you want to set network boot attributes. This could be the adapter_id/port_id, port PWWN, port name, or port hardware path.

- Enter a VLAN ID for a specific port for use when booting over the network:

  `bcu ethboot --vlan port_id vlan_id`

  where:

  `port_id`—Specifies the ID of the port for which you want to set network boot attributes. This could be the adapter_id/port_id, port PWWN, port name, or port hardware path.

  `VLAN id`—A value from 0 through 4094.

- Displays the PXE configuration on the specified port.

  `bcu ethboot --query port_id`

  where:

  `port_id`—Specifies the ID of the port for which you want to display configuration information.

All configuration values are stored to adapter flash memory.

NOTE

For details on using BCU commands, refer to instructions for ethboot in the QLogic BCU CLI appendix of the *QLogic BR Series Adapter Administrator's Guide*.

gPXE boot

This is an open source feature that allows systems without network PXE support to boot over the network. It enhances existing PXE environments using TFTP with additional protocols, such as DNS, HTTP, and iSCSI. This feature is supported on QLogic standup CNAs and Fabric Adapter ports configured in CNA or NIC mode.

gPXE functions with the PXE feature using Universal Network Device Interfaces (UNDI). Configuration is not required through the BIOS Configuration Utility, BCU commands, or HCM. Once the initial gPXE image is loaded through TFTP, the required menu is presented by the gPXE image.

Stateless boot with ESXi

Starting with ESXi 5.0, the ESXi image (image profile) resides on an "auto deploy" server. This server can stream the ESXi image to a mapped network server without local storage to boot ESXi on the server. For more information, refer to "Using VMware Auto Deployment to boot QLogic custom images" on page 243.

Boot over SAN

The “Boot Over SAN” feature allows a host to boot its operating system from a boot device directly attached to the host system or located somewhere on the SAN instead of the host’s local disk. Specifically, this “boot device” is a logical unit number (LUN) located on a storage device. LUNs can be specifically targeted to boot hosts running Windows, Linux, or VMware, or Solaris. For booting over SAN from direct-attached storage, both Fibre Channel Arbitrated Loop (FC-AL) and point-to-point (P2P) configurations are supported. For more information on how the Boot BIOS functions to implement this feature, refer to “QLogic Legacy BIOS support” on page 204.

Booting from a remote SAN location provides the obvious advantage of recovering quickly from a host or adapter malfunction. With the adapter boot BIOS enabled for booting over SAN and configured with boot device locations and boot sequences, replacing an old host with a new one involves installing the adapter from the old host into the new one with the same configuration, and then booting the new host. The host’s operating system automatically boots from the remote SAN boot device.

Although fast recovery from a malfunction is a big advantage, following are considerations for the host and adapter, depending on the replacement situation:

- Even though you install a similar host, the new host may require unique System BIOS options and other settings, or internal IDE drives may need to be disconnected or disabled to boot over SAN.
- If replacing the QLogic BR-Series Adapter in a host with a similar QLogic BR-Series Adapter, you will need to reconfigure the adapter and storage to boot from the appropriate remote boot device. You must also update access on storage device ports to reflect the adapter PWWN. Finally, you must update the single-initiator target zone created for the adapter port and storage device port with the new adapter PWWN.
- If replacing a host with a different model, you may be prompted to install the adapter driver for the existing adapter.

Booting servers from SAN-attached storage can significantly streamline server administration and facilitate server deployment. Instead of manually configuring each individual server, boot images on SAN-attached storage can be cloned and assigned to groups of servers at the same time. This not only simplifies initial configuration, but makes ongoing software updates and maintenance much easier to administer. When boot images are centrally managed on the SAN, server security, integrity, and ability to recover data are also enhanced.

Following are additional benefits of boot over SAN:

- Eliminating the requirement for local hard drives.
- Centralized storage management and administration of client workstations.

- Disaster recovery.
- More control and efficiency for software distribution.
- Increased host reliability since operating system boots from highly available storage devices.
- Improved security.

QLogic Legacy BIOS support

The boot BIOS provides boot support for the QLogic BR-Series Adapters in x86 and x64 host platforms. The BIOS can discover up to 256 storage targets, such as RAID units, and the logical unit numbers (LUNs) on those units when the LUNs are bound to adapter ports.

When adapter BIOS is enabled, the boot code loads from adapter option ROM into system random access memory (RAM) and integrates with the host system (server) BIOS during system boot to facilitate booting from LUNs, which are also referred to as “virtual drives” and “boot devices.” LUNs targeted as boot devices must contain the boot image for the host’s operating system and adapter driver. Boot over SAN can be supported on a maximum of 16 ports (for example, 8 dual-port adapters).

Configure boot over SAN and other options for Legacy BIOS systems or UEFI systems operating in Legacy BIOS mode using the BIOS Configuration Utility, BCU commands, and HCM. The BIOS Configuration Utility is embedded with the boot code.

Configuration options include the following:

- Enabling and disabling BIOS

  When enabled, the system BIOS can execute the BIOS code to boot over SAN.

- Setting port speed on HBAs and Fabric Adapter ports configured in HBA mode

NOTE

If saved on the adapter during legacy BIOS configuration, enabling or disabling BIOS and setting the port speed, will apply if UEFI is enabled on the system.

- Review adapter properties, such as the following:
  - Port speed
  - PWWN
  - NWWN
  - BIOS version
- Select a boot device from discovered targets.
- Enable one of the following boot LUN options.

  These legacy BIOS options, configured on the adapter when using the BIOS Configuration Utility, CLI, or HCM, are only applicable when configured in Legacy BIOS mode on a UEFI-capable or non-UEFI capable system.

  - Fabric Discovered (also known as fabric-based boot LUN Discovery). When enabled, boot information, such as the location of the boot LUN, is provided by the fabric (refer to “Fabric-based boot LUN discovery” on page 234 for more information).

    NOTE

    Fabric Discovered is not supported for booting from direct-attached Fibre Channel targets.

  - First LUN. The host boots from the first LUN visible to the adapter that is discovered in the fabric.
  - Flash Values. Boot LUN information will be obtained from flash memory. Note that values are saved to flash when you configure and save them through the BIOS Configuration Utility and BCU.

NOTE

To boot from direct-attached Fibre Channel targets, you must use the **First LUN** or **Flash Values** options. **Flash Values** is recommended.

For more information

For details on using the BIOS Configuration Utility, refer to “Configuring BIOS with the BIOS Configuration Utility” on page 246.

For information on using BCU commands and HCM, refer to“Configuring BIOS with HCM or BCU commands” on page 254.

For more information and configuration procedures for booting over SAN, refer to “Configuring boot over SAN” on page 211.

QLogic UEFI support

Unified Extensible Firmware Interface (UEFI) boot code for QLogic BR-Series Adapters allows boot support on UEFI-based platforms. The UEFI boot code can discover 256 storage targets, such as RAID units and logical unit numbers (LUNs) when the LUNs are bound to adapter ports. The UEFI boot code loads from adapter option ROM into system memory and integrates with the host system (server) UEFI during system boot to facilitate booting from target LUNs, which are also referred to as “virtual drives” and “boot devices.” LUNs targeted as boot devices must contain the boot image for the host, which consists of the adapter driver, host operating system, and other files that allow the host to boot from the LUN. For more information and configuration procedures for booting over SAN, refer to “Configuring boot over SAN” on page 211.

After the QLogic UEFI boot code integrates with the system UEFI during system boot, use your system’s UEFI setup screens to enable or disable BIOS on the adapter port. When enabled, available Fibre Channel devices attach as UEFI devices and obtain UEFI device names. Once the Fibre Channel devices have UEFI device names, you can select them using the host’s **Boot Configuration** menu or setup screens as boot devices.

Use the system’s UEFI setup screens to configure the following options:

- Boot over SAN for HBAs and Fabric Adapter ports configured in HBA mode.
- Port operating mode (HBA, CNA, NIC) for Fabric Adapters.

NOTE

Depending on your host system, you may be able to change only supported port operating modes.

- Port speed for HBAs and Fabric Adapter ports set in HBA mode
- LUN masking for HBAs and Fabric Adapter ports set in HBA mode
- QoS for HBAs and Fabric Adapter ports set in HBA mode
- VNICs for Fabric Adapter ports configured in CNA or NIC modes

You can also display port information such as the following:

- MAC address
- Link status
- WWPN
- Port topology (P2P or loop)
- Option ROM version
- Adapter firmware version

- Configured port mode for QLogic Fabric Adapters

NOTE

Depending on your host system, you may be able to change only supported port operating modes.

- Minimum and maximum bandwidths for configured VNICs for QLogic Fabric Adapter ports configured in NIC or CNA modes.

For more information

For general steps on configuring options with your system's UEFI setup screens, refer to "Using UEFI setup screens" on page 199.

For general configuration procedures for booting over SAN, refer to "Configuring boot over SAN" on page 211.

NOTE

The BR-804 Adapter is not supported on UEFI systems.

Booting from direct attach storage

You can use QLogic HBAs and Fabric Adapter ports configured in HBA mode to boot a host's operating system (Windows, Linux, or VMware) from a remote boot device directly attached to the host system instead of the host's local disk. Specifically, this "boot device" is a logical unit number (LUN) located on a storage device.

The QLogic BR-Series Adapter provides boot support in loop and point-to-point topology for QLogic BR-Series Adapters installed in x86 and x64 host platforms. The default topology on the adapter port is set to point-to-point. The Fabric Discovered (Auto) discovery mechanism and 16 Gbps speed to the loop are not supported.

QLogic supports the following topologies in direct attach configuration for boot over SAN:

- Fiber channel arbitrated loop) (FC-AL)
- Point-to-point (p2p)

QLogic supports FC-AL with driver version 3.1.0.0 and higher. Point-to-point direct attach topology has been supported since version 2.0.0.0.

QLogic supports the following adapters:

- BR-825 and BR-815 HBAs
- BR-1860 Fabric Adapter ports configured in HBA mode.

To configure boot over SAN from direct attached storage, follow these steps:

1. Verify the adapter is using the appropriate boot code level and update if required using procedures under “Boot code updates” on page 189.
   - For loop topology, verify that the adapter boot code is 3.1.0.0 or later. Use version 3.1.0.0 or later boot installation packages (driver update disks or LiveCD) to install drivers.
   - For point-to-point topology, verify that the adapter boot code is 3.0.0.0 or later. Use version 3.0.0.0 or later boot installation packages (driver update disks or LiveCD) to install drivers.
2. Verify the adapter port topology using the **bcu -query** *port_id* command and change if required.
   - If configuring boot over SAN in a loop topology, use the **bcu port - topology** *port_id* **loop** command to set loop topology. Default is point-to-point (p2p).
   - If configuring to boot over SAN in a point-to-point topology, use the **bcu port - topology** *port_id* **p2p** command to set loop topology. Default is point-to-point (p2p).
3. Configure boot over SAN using steps under “Configuring boot over SAN” on page 211. During steps to configure the BIOS using the BIOS Configuration Utility, the **BCU bios** commands, or UEFI setup screens, set the adapter port to the appropriate topology for the direct attach storage (loop or P2P).

Host system requirements for boot over SAN

Consider these requirements for your host system when configuring boot over SAN:

- You may need to disconnect internal IDE hard drives to disable them in the system BIOS and allow the adapter boot BIOS to boot from the remote boot device. Some systems may allow these drives to be enabled in the system BIOS if they correctly support the bootstrap protocol.
- Typically, the boot order must be CD-ROM, Fibre Channel drive, and then diskette. After the operating system installs, you can change this order if desired.

Due to the variety of configurations and variables in a SAN installations, your specific environment must determine any additional requirements to guide installation and configuration for best results.

Storage system requirements for boot over SAN

Consider these requirements for your storage system for booting over SAN:

- The SAN must be properly installed so that the location on the SAN containing the boot image is visible to the host. Verify links between the adapter and storage are working properly before attempting a boot over SAN.
- The boot LUN must contain the appropriate operating system for the host and the adapter driver. For information on minimum operating system support for drivers, refer to “Boot installation packages” on page 88 and “Host operating system support” on page 70. Refer to “Operating system and driver installation on boot LUNs” on page 217 for installation details.

NOTE

Some storage devices need the appropriate host type associated with the logical drive configured for the correct operating system. This is necessary so that the storage device can send the correct format of inquiry data to the host. Refer to your storage system documentation for specific requirements.

- Configure the storage system so that the adapter port has exclusive access to the LUN. Accomplish this by binding an adapter port PWWN to a LUN. You can easily find an adapter port PWWN using the BIOS Configuration Utility (refer to “Configuring BIOS with the BIOS Configuration Utility” on page 246). Exclusive access to the LUN can also be assured by using a LUN-management feature, such as LUN masking, zoning, or a combination of these.

NOTE

You should use LUN masking to avoid boot failures. You can enable or disable the LUN masking feature using BIOS Configuration Utility or UEFI screens.

- Only one path to the boot LUN must be visible to the operating system during the host’s boot process. If the storage device has multiple controller ports, only one port can be enabled or connected to the SAN during the operating system boot process.
- Create a specific zone containing the adapter port world-wide name (PWWN) and the target PWWN to keep RSCN interruptions from other hosts to a minimum.

- If trunking is enabled, use the PWWN of Adapter Port-0 when configuring Fabric Zones and LUN Masking for storage.

NOTE

N_Port Trunking is not supported on QLogic mezzanine adapters.

- The SAN can be connected to the host system in a switched fabric or direct-attached point-to-point or Fibre Channel Arbitrated Loop (FC-AL) topology. FC_AL is supported in Windows, Linux, and VMware environments only.

Disabling N_Port trunking

The Fibre Channel N_Port Trunking feature works in conjunction with the trunking feature on Brocade switches, whereby the Fabric Operating System (Fabric OS) provides a mechanism to trunk different switch ports of the same port group into one. Disabling the N_Port trunking feature on the adapter when using boot over SAN requires specific procedures that are included in the *QLogic BR Series Adapter Administrator's Guide*. Refer to that guide for details.

NOTE

N_Port Trunking is not supported on QLogic mezzanine adapters.

Important notes for configuring boot over SAN

Consider the following points when configuring boot over SAN on HBAs or Fabric Adapter ports configured in HBA mode:

- BIOS must be enabled on all adapter port instances that can see the boot LUN.
- The same discovery mechanism configured through the BIOS Configuration Utility, BCU, or HCM, such as First LUN, Fabric Discovered (Auto) or Flash Values, should be used for all adapter port instances exposed to the boot LUN.
- If multiple storage ports with unique PWWNs are configured to access the same boot LUN in the storage array and all PWWNs are zoned to a specific adapter port instance, then all of these PWWNs must be listed under "Boot Device Settings" in the BIOS Configuration Utility or BCU.
- If BCU or HCM is used to configure a boot LUN, a reboot is required to enable the change.

Configuring boot over SAN

You must configure boot over SAN on the adapter, as well as the storage device. Use this section to guide you through other sections in this chapter that contain complete procedures for configuring the adapter to boot from a SAN device.

Instructions are provided in this section for configuring boot over SAN on UEFI-based systems using the system's UEFI setup screens and on Legacy BIOS systems using the BIOS Configuration Utility, BCU commands, and HCM.

Instructions are provided in this section for configuring boot over SAN on UEFI-based systems that support EFI shell commands. Configuring QLogic BR-Series Adapters in UEFI mode may not be supported on some host systems. However, since QLogic BR-Series Adapters ship with all ports enabled and auto-negotiated speed enabled by default, adapters should work in most systems.

Overview

Figure 4-3 provides a flow chart for the “Procedures” on page 213 and information elsewhere in this chapter to configure your adapter, host system, and remote boot device for booting over SAN.

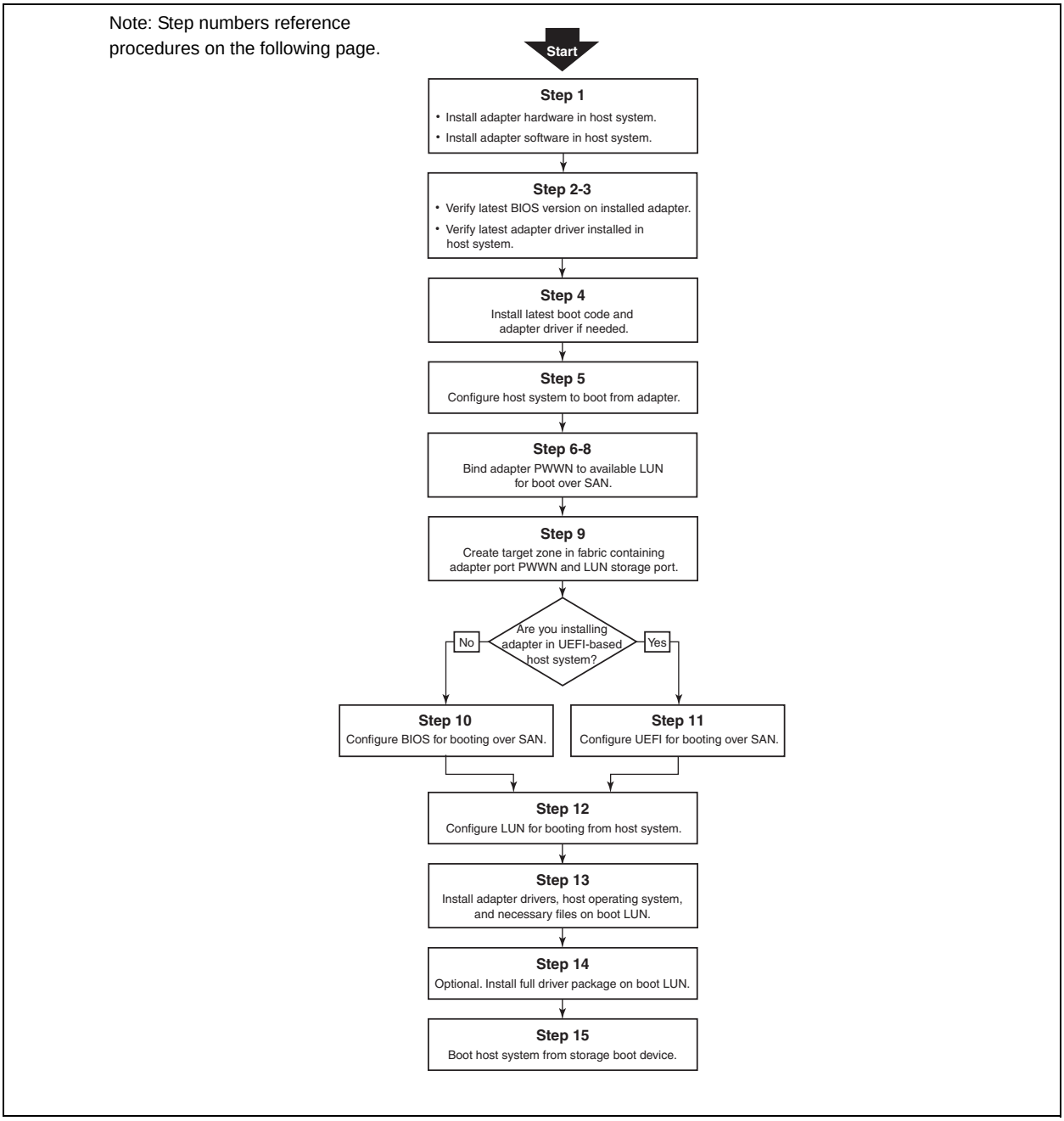

Note: Step numbers reference procedures on the following page.
Start
Step 1
• Install adapter hardware in host system.
• Install adapter software in host system.
Step 2-3
• Verify latest BIOS version on installed adapter.
• Verify latest adapter driver installed in host system.
Step 4
Install latest boot code and adapter driver if needed.
Step 5
Configure host system to boot from adapter.
Step 6-8
Bind adapter PWWN to available LUN for boot over SAN.
Step 9
Create target zone in fabric containing adapter port PWWN and LUN storage port.
Are you installing adapter in UEFI-based host system?
No
Yes
Step 10
Configure BIOS for booting over SAN.
Step 11
Configure UEFI for booting over SAN.
Step 12
Configure LUN for booting from host system.
Step 13
Install adapter drivers, host operating system, and necessary files on boot LUN.
Step 14
Optional. Install full driver package on boot LUN.
Step 15
Boot host system from storage boot device.

Figure 4-3. Configuring boot over SAN

Procedures

The following procedures are illustrated in the flow chart in Figure 4-3 on page 212. You may be referenced to more detailed sections of this chapter to complete some of these steps.

1. Install the adapter and software into the host system using instructions in 2, “Hardware Installation” and 3, “Software Installation”.
2. Verify that the adapter contains the latest BIOS version. You can use HCM or BCU commands.

   For HCM, perform the following steps.

   a. Select an adapter in the device tree.

   b. Click the **Properties** tab in the right pane to display the adapter Properties pane.

   For BCU, enter the following commands.

   a. Enter the following command to list the QLogic BR-Series Adapters installed in the system and their adapter IDs.

      ```
      bcu adapter --list
      ```

   b. Enter the following command to display information about an adapter with a specific adapter ID. The installed BIOS version displays in the *Flash Information* section of the display.

      ```
      bcu adapter --query adapter_id
      ```

3. Verify that the latest adapter driver is installed on your host system using information under “Confirming driver package installation” on page 171.

   For information on minimum operating system support for drivers, refer to “Software installation and driver packages” on page 81 and “Host operating system support” on page 70.

4. Install the latest adapter boot code and driver using the following steps.

   a. Download the latest boot code and driver package from the QLogic Web Site using the following steps.

      1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
      2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.

3. Click the driver or boot code link at the top of the page to direct you to the driver or boot code packages.
4. Locate the driver or boot code package for your adapter in the table, click on it, and then follow the directions.

b. Upgrade your adapter and boot code if necessary using the following steps.

1. Driver package. Refer to “Using software installation scripts and system tools” on page 138.
2. Boot code. Refer to “Boot code updates” on page 189.

3. Use your host system’s boot menu to enable the system to boot from the CD/DVD, diskette, and then the appropriate adapter. If multiple adapters are installed on your system, be sure to configure the system to boot from the appropriate adapter first in the boot order. Booting from the CD/DVD and diskette first allows you to install the host operating system and adapter driver on the boot LUN, but you may change this after installation. Depending on your host system, you may need to enable booting from the adapter in your system boot menu, or you may need to disable the host’s hard drive to boot from the adapter.

NOTE

If you need to disable the system’s hard drive to allow booting from the adapter and wish to utilize both the boot from SAN feature and your system’s hard drive, refer to your system documentation. Procedures for this configuration are beyond the scope of this publication.

4. Verify that the appropriate storage device is connected to the fabric and functioning. This device must have at least one LUN available that is appropriate for booting your host’s operating system.
5. Determine which adapter port you want to use for booting from SAN and note its PWWN.

   To locate the PWWN for an installed adapter port, refer to the discussion on PWWN on page 311. To find the PWWN for the port using the BIOS Configuration Utility, refer to “Configuring BIOS with the BIOS Configuration Utility” on page 246.
6. Configure the storage system so that the adapter port has exclusive access to the LUN. Consider using the following methods:

   - Using an appropriate storage management or configuration utility, bind the adapter port’s PWWN to the selected LUN.

- Mask the boot LUN for exclusive access by the adapter port and avoid boot failures using the BCU **fcpim –lunmaskadd** command and the LUN Masking tab on the HCM **Basic Port Configuration** dialog box. Refer to the *QLogic BR Series Adapter Administrator's Guide* for more information on configuring the LUN Masking feature.

7. Create a new single-initiator target zone in the SAN fabric where the adapter and storage device are attached. The zone should contain only the PWWN of the storage system port where the boot LUN is located and the PWWN of the adapter port. Refer to the *Brocade Fabric OS Administrator's Guide* for zoning procedures.

NOTE

The boot LUN zone can be precreated with a virtual PWWN for a storage system port that is bound to a switch port. The fabric assigned PWWN (FA-PWWN) feature will acquire the PWWN from the switch when it logs into the fabric. Access control lists (ACLs) can also be predefined in the targets so that switch ports can be configured for booting operating systems supported by QLogic BR-Series Adapters. Although FA-PWWN is enabled by default on the HBA port, you must enable this feature on the switch port so that the HBA can acquire the PWWN. For details on the FA-PWWN feature, including configuration, requirements, and limitations, refer to the *Brocade Fabric OS Administrator's Guide*.

8. For Legacy BIOS systems, use one of the following sections to enable the adapter and boot devices for booting over SAN:
   - "Configuring BIOS with the BIOS Configuration Utility" on page 246.
   - "Configuring BIOS with HCM or BCU commands" on page 254.
9. For UEFI systems, use one of the following sections to enable the adapter and boot devices for booting over SAN:
   - "Configuring UEFI" on page 255
   - "IBM Agentless Inventory Manager (AIM) support" on page 259.
10. Configure the LUN for booting your host system. Refer to procedures required by your host platform and operating system.
11. Install boot image on the boot LUN. The boot image consists of the adapter driver, host operating system, and other necessary files to allow the host to boot from the boot device. Refer to "Operating system and driver installation on boot LUNs" on page 217.

For information on minimum operating system support for drivers, refer to “Boot installation packages” on page 88 and “Host operating system support” on page 70.

12. Install full driver package (drivers, utilities, HCM agent) to boot LUN. Refer to “Installing the full driver package on boot LUNs” on page 233.
13. Boot the host from the SAN storage boot device using procedures required by your host system. As the system boots, information about successful BIOS installation should display. In addition, information should display about the QLogic BR-Series Adapter and boot LUN in the systems boot device menu.

Providing Windows crash dump on remote LUN

When configuring boot over SAN on Windows systems, make sure that the following steps are completed to assure that the crash dump file is posted to the remote LUN:

- BIOS must be enabled on all HBA port instances that can access the boot LUN.
- Select the same discovery mechanism for the boot LUN for all adapter port instances for which the boot LUN is exposed.
  - If configuring boot over SAN using the BIOS Configuration Utility, select Fabric Discovered, Flash Values, or First LUN.
  - If configuring boot over SAN using BNA commands, select Fabric Discovered, First Visible LUN, or User Configured LUNs.
- If multiple storage ports with unique PWWNs are configured to access the same boot LUN in the storage array and all PWWNs are zoned to a specific HBA port instance, then all such PWWNs must be selected as boot devices through the BIOS Configuration Utility or BCU.
- If using BCU or HCM to configure boot over SAN, a reboot is required for the change to be effective.

Operating system and driver installation on boot LUNs

Use the procedures in this section to install the host operating system and adapter drivers on an unformatted disk that you configured as a bootable device when setting up the adapter BIOS or UEFI on the host system. Instructions are provided for the following:

- Installing Windows and the driver
- Installing Linux RHEL 4.x or 5.x and the driver
- Installing Linux (SLES 10 and later) and the driver
- Installing RHEL 6.x or Oracle Linux (OL) 6.x and the driver
- Installing Solaris and the driver
- Installing VMware and the driver
- Installation on systems supporting UEFI

For information on operating system support for drivers, refer to “Boot installation packages” on page 88 and “Host operating system support” on page 70.

Before installing the operating system and adapter drivers, be sure you have bound the PWWN of the appropriate adapter port to the designated boot LUN and have configured the BIOS or UEFI on your host system for booting over SAN. Refer to “Configuring boot over SAN” on page 211, “Configuring BIOS with the BIOS Configuration Utility” on page 246, and “IBM Agentless Inventory Manager (AIM) support” on page 259 for instructions.

NOTE

The following procedures load the operating system, adapter drivers, and utilities to the designated boot LUN to allow adapter operation and booting your host system from the LUN. However, the HCM Agent and full range of QLogic Command Line Utilities, such as bfa_supportsave, are not installed. To install the complete driver package with HCM Agent and full-range of utilities, refer to “Installing the full driver package on boot LUNs” on page 233 after completing the following steps.

Installing Windows and the driver

Use the following steps to install Windows Server 2008 R2 and the adapter driver on an unformatted disk that you configured as a bootable device when setting up the adapter BIOS or UEFI on the host system.

If the LUN you have targeted for booting over SAN already has an operating system installed, be sure to use options for reformatting the LUN during Windows Server 2008 R2 installation. Refer to your operating system documentation for details.

NOTE

For HBAs and Fabric Adapter ports configured in HBA mode, you will need the fc dud file, brocade_adapter_fc_*operating system_platform*_dud_*version*.zip. For CNAs and Fabric Adapter ports configured in CNA mode, you will need the fcoe dud file, brocade_adapter_fcoe_w2k8_x86_dud_*version*.zip.

For Microsoft Windows operating systems, the driver update disk does not verify prerequisite checks as part of installation. Please review the operating system prerequisites and install the necessary hotfixes after the operating system installation is complete.

1. Driver update disk files are provided for x86 and x64 systems. Refer to "Boot installation packages" on page 88 for a list of driver update disk files and the operating systems that support these files. Also refer to "Host operating system support" on page 70 for information on operating system support for adapter drivers.
2. Download the Windows Server 2008 R2 adapter driver update disk (DUD) .zip file for your host platform from the QLogic Web Site:
   a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
   b. In the table, select the adapter type in first column, the adapter model in the second column, **Windows Server 2008 R2** in the third column, and then click **Go**.
   c. Click the **Driver Update Disks** link at the top of the page to direct you to the DUD zip file.
   d. Locate the DUD link for your adapter in the table, click on it, and following the instructions.
3. Unzip the file and copy to a CD, USB drive, or formatted floppy disk to create the adapter driver update disk.
4. Insert the Windows Server 2008 R2 operating system installation DVD into the system drive and boot from the DVD.
5. Respond to prompts that display on the Windows installer screens. Be sure to select a Standard (Full Installation) and accept the software license.
6. When the **Which type of installation do you want?** screen displays, select **Custom (advanced)**.
7. When the **Where do you want to Install Windows?** screen displays, select the **Load Driver** option at the bottom of the screen.

The **Load Driver** dialog box displays, prompting you to insert the installation media containing the driver files.

NOTE

You must load the QLogic BR-Series Adapter driver at this stage so that the system can access the boot LUN for Windows Server 2008 R2 Server installation.

8. Insert the media containing the QLogic BR-Series Adapter driver update files that you created in Step 3.
9. Select **Browse** on the **Load Driver** dialog box and select the adapter driver update disk.
10. Click **OK**.

NOTE

If “Hide drivers that are not compatible with hardware on this computer” is selected, only drivers for installed adapter models will display on the **Select the drive to be installed** screen. If not selected, drivers for all adapter models display.

11. Select the driver for the adapter that you are configuring for boot over SAN and click **Next**.

    After the driver loads, remote LUNs display on the **Where do you want to install Windows?** screen that are visible to the adapter port.
12. Replace the driver update disk with the Windows Server 2008 R2 DVD.
13. Select the LUN that you have identified as the boot device for the adapter port and click **Next**.

NOTE

Selecting **Drive options (advanced)** provides other options for editing the destination disk, such as formatting a partition (when the operating system already installed) and creating a new partition.

14. Continue responding to on-screen instructions and refer to your system documentation as necessary to format and complete installation on the target boot LUN.

    After Windows installs on the remote LUN, the system should automatically reboot from the LUN.

Messages should display on the host system as the QLogic BIOS or UEFI loads successfully. System boot setup screens should also display a hard drive entry containing the QLogic BR-Series Adapter, boot LUN number, and target storage device.

Installing Linux RHEL 4.x or 5.x and the driver

Use the following steps to install RHEL and the adapter driver on an unformatted disk that you configured as a bootable device when setting up the adapter BIOS or UEFI on the host system.

If the LUN you have targeted for booting the host system already has an operating system installed, be sure to use options for reformatting the LUN during Linux installation. Refer to your operating system documentation for details.

NOTE

The following procedures load the operating system, adapter driver, and utilities to the designated boot LUN to allow adapter operation and booting your host system from the LUN. However, the HCM Agent and full range of QLogic Command Line Utilities, such as bfa_supportsave, are not installed. To install the complete driver package with HCM Agent and full-range of utilities refer to “Installing the full driver package on boot LUNs” on page 233 after completing the following steps.

1. Refer to “Boot installation packages” on page 88 for a list of driver update disk files and the operating systems that support these files. Also refer to “Host operating system support” on page 70 for information on operating system support for adapter drivers.

   NOTE

   For RHEL 5 x86 and x86_64 systems, install the fc DUD files for CNAs and Fabric Adapter ports configured in CNA mode and for HBAs and Fabric Adapter ports configured in HBA mode. The fc dud file format is brocade_fc_adapter_*operating system*_*platform*_dud_*version*.iso.

2. Download the RHEL adapter driver update disk (DUD) .iso file for your host platform from the QLogic Web Site:

   a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.

   b. In the table, select the adapter type in first column, the adapter model in the second column, **Linux Red Hat** in the third column, and then click **Go**.

c. Click the **Driver Update Disks** link at the top of the page to direct you to the DUD zip file.

d. Locate the DUD link for your adapter in the table, click on it, and following the instructions.

3. Create a driver update disk CD or USB drive from the ISO image.

4. Insert the Linux Red Hat product CD #1 into the host system's CD drive and boot the system.

5. At the boot prompt enter one of the following commands and press **Enter**:

- For booting over SAN, use the following command.

```
linux dd
```

- For booting over SAN with multi path, use the following command.

```
linux dd mpath
```

NOTE

The *mpath* option installs the operating system and driver to a LUN connected to the server through multiple paths and provides a unique and single name for the device. If the *mpath* option were not used in a multi-path configuration, a separate device instance would display for each path during installation. By using the option, only one instance displays for the device, although multiple paths still exist.

6. When the **Driver Disk** message box displays the "Do you have a driver disk" prompt, select **Yes**, and then press **Enter**.

NOTE

You must load the QLogic BR-Series Adapter driver at this stage so that the system can access the boot LUN for Linux installation.

7. From the **Driver Disk Source** window, select the driver source *hdx* (where x is the CD or USB drive letter), and then press **Enter**.

   The **Insert Driver Disk** window displays.

8. Insert the driver update disk (dud) that you created in Step 3 into the CD or DVD.

9. Select **OK**, and then press **Enter**.

   The driver loads automatically.

10. When the **Disk Driver** window displays prompting for more drivers to install, select **No** or **Yes** depending on the installed adapter and operating system, and then press **Enter**.

    For RHEL 5 and later on x86 and x86_x64 platforms install the fc dud for an HBA, Fabric Adapter port configured in HBA mode, CNA, or Fabric Adapter port configured in CNA mode. The fc file format is brocade_fc__adapter_*operating system_platform*_dud_*version*.iso.

11. Insert the Linux Red Hat product CD #1 in the CD drive (remove the adapter driver update CD first if necessary), and then press **Enter**.

12. Continue responding to on-screen instructions and refer to your system documentation as necessary to format and complete installation on the target boot LUN.

Installing Linux (SLES 10 and later) and the driver

Use the following steps to install SLES 10 and later and the adapter driver on an unformatted Fibre Channel disk configured as a bootable device. To install SLES 11 on UEFI-supported systems, refer to "Installation on systems supporting UEFI" on page 231.

If the LUN you have targeted for booting over SAN already has an operating system installed, be sure to use options for reformatting the LUN during Linux installation. Refer to your operating system documentation for details.

NOTE

If you are installing SLES 11 for systems with HBAs and Fabric Adapter ports configured in HBA mode only, the appropriate drivers are included with the SLES product CD, so you can ignore steps 1 through 3 in the following procedures. However, if the driver is not detected on the SLES product CD during installation, you should download the latest driver update ISO file, create a driver update disk CD or USB drive, and use this to install drivers as outlined in the following steps.

1. Refer to "Boot installation packages" on page 88 for a list of these files and the operating systems that support these files. Also refer to "Host operating system support" on page 70 for information on operating system support for adapter drivers.

2. Download the driver update disk (DUD) .iso file for your SLES system from the QLogic **Web Site**:

a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.

b. In the table, select the adapter type in first column, the adapter model in the second column, **Linux SUSE SLES** in the third column, and then click **Go**.

c. Click the **Driver Update Disks** link at the top of the page to direct you to the DUD zip file.

d. Locate the DUD link for your adapter in the table, click on it, and following the instructions.

3. Create a driver update disk CD or USB drive from the ISO image.

4. Insert the SLES product CD #1 into the host system drive and follow your system procedures to boot from the CD.

   The main installation screen eventually appears.

5. Perform the following steps depending on your host platform:

   - For SLES 10 systems, press F5.

     When the system prompts to select **Yes**, **No**, or **File**, select **Yes** and press **Enter**.

   - For SLES 11 systems, press F6.

     When the system prompts to select **Yes**, **No**, or **File**, select **Yes** and press **Enter**.

6. When the “Please choose the driver update medium” prompt displays, install the CD or USB drive containing the driver update disk that you created in Step 3.

NOTE

You must load the QLogic BR-Series Adapter driver at this stage so that the system can access the boot LUN for Linux installation. If you are installing SLES 11 drivers for HBAs and Fabric Adapter ports configured in HBA mode only, drivers are located on the SLES product CD. You do not have to use the SLES driver update disk to install drivers unless the appropriate driver is not detected on the product CD.

7. Select the drive where the driver update disk is loaded then press **Enter**.

   The driver update loads to the system.

   If the driver update was successful, a “Driver Update OK” message displays:

8. Press **Enter**.
9. If the system prompts you to update another driver, select **BACK**, and then press **Enter**.
10. When the “Make sure that CD number 1” message displays, insert the SLES product CD #1 into the drive and select **OK**.
11. Continue responding to on-screen instructions and refer to your system documentation as necessary to format and complete installation on the target boot LUN.

    After SLES installs on the remote LUN, the system should automatically reboot from the LUN.

Installing RHEL 6.x or Oracle Linux (OL) 6.x and the driver

Use the following steps to install RHEL 6.x or OL 6.x and the adapter driver on an unformatted disk that you configured as a bootable device when setting up the adapter BIOS or UEFI on the host system.

If the LUN you have targeted for booting the host system already has an operating system installed, be sure to use options for reformatting the LUN during Linux installation. Refer to your operating system documentation for details.

The following instructions apply to QLogic adapter models BR-815, BR-825, BR-1020, BR-1007, BR-1741, and BR-1860. If using another adapter, you can install RHEL drivers as usual (refer to “Installing Linux RHEL 4.x or 5.x and the driver” on page 220). This installs the noarch version of the adapter drivers.

NOTE

The following procedures load the operating system, adapter driver, and utilities to the designated boot LUN to allow adapter operation and booting your host system from the LUN. However, the HCM Agent and full range of QLogic Command Line Utilities, such as bfa_supportsave, are not installed. To install the complete driver package with HCM Agent and full-range of utilities refer to “Installing the full driver package on boot LUNs” on page 233 after completing the following steps.

1. Refer to “Boot installation packages” on page 88 for a list of driver update disk files and the operating systems that support these files. Also refer to “Host operating system support” on page 70 for information on operating

system support for adapter drivers.

NOTE

Install the fc dud for an HBA, Fabric Adapter port configured in HBA mode, CNA, or Fabric Adapter port configured in CNA mode. The fc file format is brocade_fc__adapter_*operating system_platform*_dud_*version*.iso.

2. Download the RHEL 6.x adapter driver update disk (DUD) .iso file for your host platform from the QLogic Web Site:
   a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
   b. In the table, select the adapter type in first column, the adapter model in the second column, **Linux Red Hat** in the third column, and then click **Go**.
   c. Click the **Driver Update Disks** link at the top of the page to direct you to the DUD zip file.
   d. Locate the DUD link for your adapter in the table, click on it, and following the instructions.
3. Create a driver update disk CD or USB drive from the ISO image.
4. Insert the operating system CD or USB drive into the host system's CD drive, depending on the operating system you are installing.
5. Boot the system.
6. When the Welcome screen displays with a message to "Press [Tab] to edit options," press the **Tab** key.

NOTE

For UEFI mode, press any key to edit options.

7. Press a to modify kernel arguments, and then append "linux dd" to the following line:

```
vmlinuz initrd=initrd.img linux dd
```

8. When prompted to load the driver, insert the driver update disk (dud) that you created in Step 3 into the CD, DVD, or USB drive.

9. Follow system prompts to load the driver and continue with operating system installation. Refer to your system documentation as necessary to format and complete installation on the target boot LUN.
10. Reboot the system.

    On Oracle images, the system will default to the Unbreakable Kernel. The following message may display:

    ```
    No root device found. Boot has failed, sleeping forever.
    ```

    This error occurs because QLogic BR-Series Adapter drivers do not support this kernel for boot over SAN. You must switch to the Red Hat Compatible Kernel using Step 11 through Step 14.
11. Reboot the system again.
12. When the following messages display, press any key.

    ```
    Press any key to enter the menu
    Booting Oracle Linus Server-uek (2.6.32-100.28.5.el6.x86_64)
    in 1 seconds...
    ```
13. When the screen displays for selecting the Oracle Linux Server-uek or Oracle Linux Server-base kernels, select the *base* kernel.
14. When the operating system successfully boots, make the base kernel the default boot option using the following steps:
    a. Log in as “root.”
    b. Right-click the screen and select **Open Terminal** from the menu.
    c. Edit the /boot/grub/menu.lst file and change “default=0” to “default=1”. Also comment out the “hiddenmenu” line (#hiddenmenu).
    d. Change the timeout to 15 seconds instead of the default 5 (recommended).
    e. Save the file and reboot.
15. The RHEL-compatible kernel should now boot by default.

Installing Solaris and the driver

Use the following steps to install Solaris and drivers on an unformatted Fibre Channel disk that you that you configured as a bootable device when setting up the adapter BIOS or UEFI on the host system.

Installation notes

Read through these important notes before installing Solaris and adapter drivers on the LUN.

- If the LUN you have targeted for booting over SAN already has an operating system installed, be sure to use options for reformatting the LUN during Solaris installation. Refer to your operating system documentation for details.
- Before proceeding with these steps, detach or disable any existing local hard disks on your host system since the installation will pick the local disk by default for installation. You can reconnect or enable this drive after installing these procedures.
- Boot over SAN is not supported on Solaris SPARC systems.
- BR-804 and BR-1007 adapters are not supported on Solaris systems.

Installation procedure

1. Refer to “Boot installation packages” on page 88 for a list of these files and the operating systems that support these files. Also refer to “Host operating system support” on page 70 for information on operating system support for adapter drivers.
2. Download the QLogic BR-Series Adapter driver update .iso file appropriate for your system from the QLogic Web Site using the following steps:
    a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
    b. In the table, select the adapter type in first column, the adapter model in the second column, **Solaris x86** or **Solaris SPARC** in the third column, and then click **Go**.
    c. Click the **Driver Update Disks** link at the top of the page to direct you to the DUD zip file.
    d. Locate the DUD link for your adapter in the table, click on it, and following the instructions.
3. Create an “install time update” CD or USB drive from the ISO image.
4. Power up the host system.
5. Insert the Solaris installation DVD into the system DVD drive.

6. Select **Solaris** installation at the GRUB boot menu as shown in Figure 4-4.

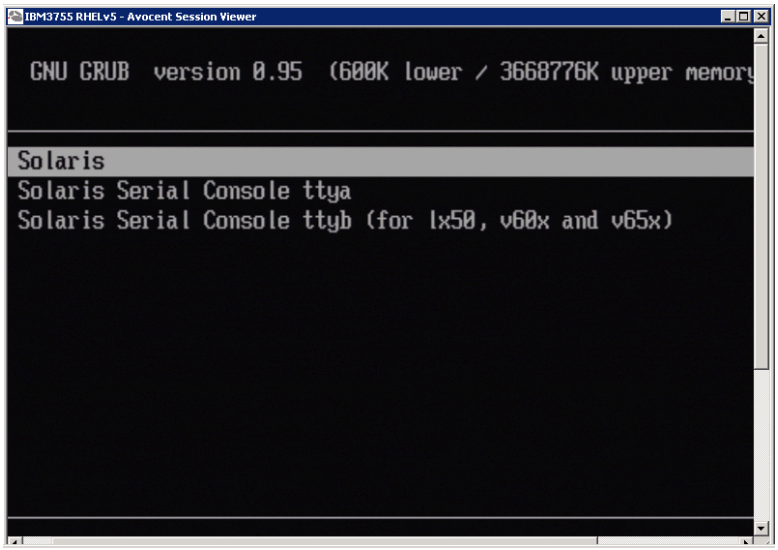

IBM3755 RHELv5 - Avocent Session Viewer
GNU GRUB version 0.95 (600K lower / 3668776K upper memory
Solaris
Solaris Serial Console ttya
Solaris Serial Console ttyb (for lx50, v60x and v65x)

Figure 4-4. GRUB Boot Menu (Solaris selected)

If devices are configured, a menu should display such as the example in Figure 4-5.:

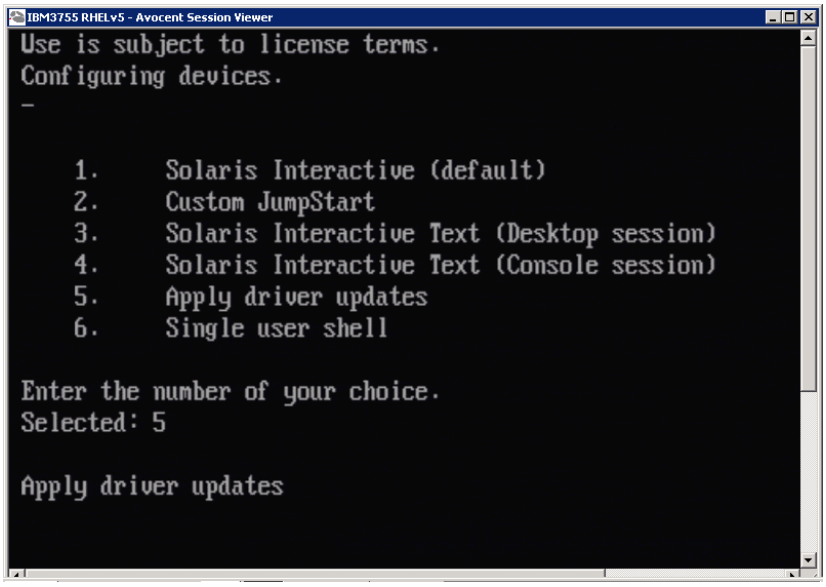

IBM3755 RHELv5 - Avocent Session Viewer
Use is subject to license terms.
Configuring devices.
1. Solaris Interactive (default)
2. Custom JumpStart
3. Solaris Interactive Text (Desktop session)
4. Solaris Interactive Text (Console session)
5. Apply driver updates
6. Single user shell
Enter the number of your choice.
Selected: 5
Apply driver updates

Figure 4-5. GRUB Boot Menu (Configuring devices)

7. Press “5” to select **Apply Driver Updates.**

8. Replace the Solaris installation DVD with the install time update CD or USB drive that you created in Step 3.

NOTE

You must load the QLogic storage driver at this stage so that the system can access the boot LUN for Solaris installation.

9. When the update completes, eject the install time update CD or USB drive containing the driver update.
10. Insert the Solaris installation CD/DVD.
11. Continue responding to on-screen instructions and refer to your system documentation as necessary to format and complete installation on the target boot LUN.

Installing VMware and the driver

Use the following steps to install VMware and the adapter driver on an unformatted Fibre Channel disk that you that you configured as a bootable device when setting up the adapter BIOS or UEFI on the host system.

If the LUN you have targeted for booting over SAN already has an operating system installed, be sure to use options for reformatting the LUN during VMware installation. Refer to your operating system documentation for details.

NOTE

For boot over SAN on VMware 4.0 and later systems, if driver installation or updates are done for CNAs and Fabric Adapter ports configured in CNA mode using the ISO image, update the storage drivers using the *bfa* DUD. For HBAs and Fabric Adapter ports configured in HBA mode, just use the bfa ISO image.

Note that you can use the VMware Image Builder PowerCLI to create a brocade_esx50_*version*.zip offline bundle and brocade_esx50_*version*.iso ESXi 5.0 installation image that includes QLogic drivers and utilities. Refer to your Image Builder documentation for details on using Image Builder PowerCLI.

1. Refer to “Boot installation packages” on page 88 for a list of driver update files and the operating systems that support these files. Also refer to “Host operating system support” on page 70 for information on operating system support for adapter drivers.

2. Download the QLogic BR-Series Adapter driver update .iso file appropriate for your system from the QLogic Web Site using the following steps:
   a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
   b. In the table, select the adapter type in first column, the adapter model in the second column, **VMware ESX/ESXi** in the third column, and then click **Go**.
   c. Click the **Driver Update Disks** link at the top of the page to direct you to the DUD zip file.
   d. Locate the DUD link for your adapter in the table, click on it, and following the instructions.
3. Create a Fibre Channel driver CD or USB drive from the ISO image. This will contain the appropriate VMware drivers for the system.
4. Insert the ESX OS disk into the host system.
5. When prompted for an upgrade or installation method, select the graphical mode.

   Installation messages display followed by a welcome screen.
6. Follow on-screen prompts to continue and accept the license agreement.
7. If prompted for Installation Options, select **Complete Server install, formatting installation hard disks**.
8. Select your keyboard type when prompted.
9. When prompted to load “custom drivers,” insert the Fibre Channel Driver CD or USB drive into the host system.

NOTE

You must load the QLogic BR-Series Adapter driver at this stage so that the system can access the boot LUN for VMware installation.

After adding drivers to the list, you are prompted to reinsert the ESX 5.1 OS disk into the host system.

10. Reinsert the ESX disk and follow prompts to load the drivers.
11. Continue responding to on-screen instructions to configure the system for installing ESX. For detailed instructions, refer to the *Server Installation and Upgrade Guide* for your operating system version.

12. When prompted for a location to install ESX, be sure to select the boot LUN that you have configured as a bootable device from the list of discovered storage targets.
13. Continue responding to system prompts complete configuration and installation on the boot LUN.
14. When you reboot the system, be sure to set up BIOS to boot from the LUN where you installed ESX.

Installation on systems supporting UEFI

The newer IBM and Dell systems can operate in either UEFI mode or Legacy BIOS mode. The following is an example procedure for these systems. Since installation on your system may vary, be sure to consult your system's documentation as you follow these steps.

NOTE

These procedures are for SLES 11, SLES 11 SP1, and SLES 11 SP2 only.

If the LUN you have targeted for booting over SAN already has an operating system installed, be sure to use options for reformatting the LUN operating system installation. Refer to your operating system documentation for details.

1. Refer to "Boot installation packages" on page 88 for a list of these files and the operating systems that support these files. Also refer to "Host operating system support" on page 70 for information on operating system support for adapter drivers.
2. Download the QLogic BR-Series Adapter driver update .iso file appropriate for your system from the QLogic website using the following steps:
    a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
    b. In the table, select the adapter type in first column, the adapter model in the second column, **Linux SUSE SLES** in the third column, and then click **Go**.
    c. Click the **Driver Update Disks** link at the top of the page to direct you to the DUD zip file.
    d. Locate the DUD link for your adapter in the table, click on it, and following the instructions.
3. Create a driver update disk CD or USB drive from the ISO image.

4. Set one of the following modes, depending on your system. Following are some examples:
   - Dell 11G or 12G systems—set UEFI boot mode.
   - IBM 3000 series M2 systems—move boot option “Legacy only” below UEFI boot entries in the boot options menu.
5. Insert the SLES 11 product CD #1 into your host system’s drive and follow your system procedures to boot from the CD.
6. Proceed with the SLES 11 installation.
7. During installation, at the first opportunity choose to abort the installation.

   The **Expert Mode** menu should display.
8. From the **Expert Mode** menu, select **Kernel Settings**, and then the option to load a driver update disk.
9. Insert the CD or USB drive with driver update that you created in Step 3.

NOTE

You must load the QLogic BR-Series Adapter driver at this stage so that the system can access the boot LUN for Linux installation.

10. Select the appropriate disk drive with the driver update disk then press **Enter**.

    The driver loads to the system.

    If the driver update was successful, a “Driver Update OK” or similar message displays:
11. Press **Enter**.
12. If the system prompts you to update another driver, select **BACK**, and then press **Enter**.
13. When prompted to insert the SLES 11 product CD #1, insert the CD into the drive and select **OK**.
14. Continue responding to on-screen instructions and refer to your system documentation as necessary to format and complete installation on the target boot LUN.

    After SLES installs on the remote LUN, the system should automatically reboot from the LUN.

Installing the full driver package on boot LUNs

The preceding procedures for each operating system under “Operating system and driver installation on boot LUNs” on page 217, do not install the HCM Agent and the full range of QLogic BCU CLI. To install the full driver package with adapter agent and all BCU commands, including bfa_supportsave, perform these additional steps.

NOTE

For information available driver packages and operating system support for drivers, refer to “Software installation and driver packages” on page 81 and “Host operating system support” on page 70.

1. Compare the version of the full driver package that you wish to install with the version of the driver already installed on the boot LUN. There are a variety of methods to determine the driver version installed on your operating system. Refer to “Confirming driver package installation” on page 171 for more information.

   If the versions do not match, you will perform additional steps to initialize the new package on your system.

2. Install the full driver package using steps for your operating system under “Using the QLogic Adapter Software Installer” on page 113

   - If the driver that you install and the driver already installed on the LUN match, perform steps as normal to complete installation. You will be able to use the additional utilities and HCM Agent installed with the full package.

     For Linux systems, install the latest version of brocade_driver_linux_*version*.tar.gz using instructions under “Driver installation and removal on Linux systems” on page 146. This will install all package utilities without updating the driver. You do not need to reboot the system.

   - If the driver that you install and the driver already installed on the LUN do not match, reboot the system to initialize the new driver.

Fabric-based boot LUN discovery

This feature allows the QLogic BR-Series Adapter to automatically discover and boot from LUN information retrieved from the SAN fabric zone database and therefore not require the typical server boot interrupt and BIOS setup.

NOTE

This feature is only supported on host systems operating in Legacy BIOS mode.

When QLogic's Fabric-based boot LUN discovery is enabled, the host's boot LUN information is stored in a SAN fabric zone. This zone contains zone members that include the PWWN of the adapter port and PWWN and LUN WWN of the storage target. The adapter boot code will query the zone member list for the zone name that matches the adapter PWWN to determine the boot target and LUN.

NOTE

Fabric-based boot LUN discovery (auto discovery from fabric) is only applicable when configured in legacy BIOS mode for either UEFI-capable or non-UEFI capable system.

Fabric-based boot LUN discovery is the default setting for the QLogic BIOS *Boot LUN* option. The feature does not apply to UEFI, as the UEFI stack implemented by the server vendor does not support boot LUN discovery from the fabric.

This automated feature requires that the connected SAN fabric switch support the Get Zone Member List (GZME) command. Fabric-Based Boot LUN Discovery has been tested with Brocade switches (Fabric OS 6.2 and above) and Cisco SAN switches (SAN-OS 3.2.x and 4.1.x).

Example configuration procedures are provided for Brocade fabrics following and Cisco fabrics on page 237.

NOTE

Fabric-based boot LUN discovery is not supported for booting from direct-attached targets.

Configuring fabric-based boot LUN discovery (Brocade fabrics)

For Brocade fabrics, the following methods are available to store the boot LUN information in the fabric zone database:

- Using the Fabric OS **bootluncfg** command to transparently configure the boot LUN.
- Using the BCU **boot --blunZone** command to provide the zone name and zone members to use as operands in the Fabric OS **zoneCreate** command.

Using Fabric OS bootluncfg command

Fabric-based boot LUN discovery allows the host's boot LUN information to be stored in the fabric zone database by using a zone name that contains the PWWN of an HBA port. The zone members consist of storage target PWWN and LUN ID.

The **bootluncfg** command provides a simplified and transparent procedure for configuring the boot LUN. Once configured, the HBA boot code queries the zone member list for the zone name matching the HBA PWWN to determine the boot target and LUN. For details on this command and additional parameters, refer to the *Fabric OS Command Reference Guide*.

Using BCU boot --blunZone command

Use the Fabric OS **zoneCreate** command to create a zone on the switch where the adapter is connected.

```
zonecreate "zonename", "member[; member...]"
```

- The “zonename” operand will be “BFA_[adapter port WWN]_BLUN.” For example, if the adapter PWWN is 01:00:05:1E:01:02:03:04, the zone name will be the following.

  BFA_0100051E01020304_BLUN

- The zone “member” operands must be specially coded values for the target PWWN and LUN identification (for example, 06:00:00:02:DD:EE:FF:00).

  To obtain the **zoneCreate** operand values, you will run the BCU **boot --blunZone** command from your host system’s command line.

Use the following steps to configure fabric-based boot LUN discovery.

1. Set the adapter’s BIOS configuration to fabric discovered using one of the following interfaces:

   - BIOS Configuration Utility

     Adapter Settings > Boot LUN > Fabric Discovered

- HCM

  Basic Port Configuration > Boot-over-SAN > Fabric Discovered

- BCU

  `bios --enable port_id -o auto`

2. Enter the following BCU command to provide the zone name and zone members to use as operands in the Fabric OS **zoneCreate** command.

   `bcu boot --blunZone -c cfg -p port_wwn -r rport_wwn -l lun_id | lun#`

   where:

   `c cfg`—Specifies boot LUN (use -c BLUN).

   `p port_WWN`—The hexadecimal WWN of the adapter port connecting to the boot LUN. For example, 10:00:00:05:1e:41:9a:cb.

   `r rport_WWN`—The hexadecimal WWN of the remote storage target's port. For example, 50:00:00:05:1e:41:9a:ca.

   `l lun_id | lun#`—The hexadecimal LUN identification. You can provide this as a hexadecimal one-Byte value or an eight-Byte value (four-level LUN addressing). For example, an eight-Byte value could be 09AABBCCDDEEFF00.

   NOTE

   Enter **boot --blunZone** without operands to display the command format.

   For example, enter the following:

   ```
   bcu boot --blunZone -c BLUN -p 10:00:00:05:1e:41:9a:cb -r
   50:00:00:05:1e:41:9a:ca -l 09AABBCCDDEEFF00
   ```

   The command output will contain the proper encoding and be in the exact format for the FOS OS **zoneCreate** command.

3. Configure the zone on the switch using the Fabric OS **zoneCreate** command. Use the displayed output from the BCU **boot --blunZone** command as the zonename and member operands:

   ```
   zonecreate "zonename", "member[; member...]"
   ```

For example, if the output from **boot --blunZone** is the following, you simply enter this for the **zoneCreate** command operands on the switch.

```
"BFA_100000051E419ACB_BLUN","00:00:00:00:50:00:00:05;
00:00:00:01:1e:41:9a:ca; 00:00:00:02:DD:EE:FF:00;
00:00:00:03:09:AA:BB:CC"
```

4. Enter the FOS OS **cfgSave** command on the switch to save the zone configuration.
5. Enter the FOS OS **cfgenable** command to enable the configuration.

NOTE

The zone created is only an entity to store boot LUN data. There is no zone enforcement by the fabric. You must create a separate zone containing the adapter port and storage target port to ensure that the adapter port is able to see the target.

Configuring fabric-based boot LUN discovery (Cisco fabrics)

For CISCO fabrics, zones are configured within VSANs. Before you begin, determine the VSAN configured in a current fabric for which you want to configure a zone to include boot LUN information. Also, you must enable enterprise zoning. Note that zone information must always be identical for all switches in the fabric.

To store the boot LUN information in the fabric zone database, you must use the **zone name** and **member** commands while in switch configuration mode.

- The “zone name” command will be “BFA_[adapter port WWN]_BLUN.” For example, if the adapter PWWN is 01:00:05:1E:01:02:03:04, the zone name will be the following.

  BFA_0100051E01020304_BLUN

- The “member” command must be specially coded values for the target PWWN and LUN identification (for example, 06:00:00:02:DD:EE:FF:00).

  To obtain the **zone name** and **member** values, you will run the BCU **boot --blunZone** command from your host system’s command line.

Use the following steps to configure fabric-based boot LUN discovery.

1. Set the adapter’s BIOS configuration to automatic discovery of the boot LUN from the fabric using one of the following interfaces:

   - BIOS Configuration Utility

     Adapter Settings > Boot LUN > Fabric Discovered

- HCM

  Basic Port Configuration > Boot-over-SAN > Fabric Discovered

- BCU

  `bios --enable port_id -o auto`

The command output will contain the proper encoding and be in the exact format for the **zone name** and **member** commands.

2. Enter the following BCU command to provide the zone name and member for the switch commands.

   `bcu boot --blunZone -c cfg -p port_wwn -r rport_wwn -l lun_id | lun#`

   where:

   `c cfg`—Specifies boot LUN (use -c BLUN).

   `p port_WWN`—The hexadecimal WWN of the adapter port connecting to the boot LUN. For example, 10:00:00:05:1e:41:9a:cb.

   `r rport_WWN`—The hexadecimal WWN of the remote storage target's port. For example, 50:00:00:05:1e:41:9a:ca.

   `l lun_id | lun#`—The hexadecimal LUN identification. You can provide this as a hexadecimal one-Byte value or an eight-Byte value (four-level LUN addressing). For example, an eight-Byte value could be 09AABBCCDDEEFF00.

   NOTE

   Enter **boot --blunZone** without operands to display the command format.

   For example, enter the following:

   ```
   bcu boot --blunZone -c BLUN -p 10:00:00:05:1e:41:9a:cb -r
   50:00:00:05:1e:41:9a:ca -l 09AABBCCDDEEFF00
   ```

   The command output will contain the proper encoding for the **zone name** and **member** commands. As an example, refer to the following output.

   ```
   "BFA_100000051E419ACB_BLUN","00:00:00:00:50:00:00:05;
   00:00:00:01:1e:41:9a:ca; 00:00:00:02:DD:EE:FF:00;
   00:00:00:03:09:AA:BB:CC"
   ```

3. Enter the following command to launch configuration mode.

```
switch# config t
```

4. Enter the following command to name the zone for a specific VSAN, for example VSAN 8.

```
switch (config)# zone name [name]
```

where

name—Use the output from the **boot --blunZone** command. For example, from the output example shown in Step 3, you would use

```
switch (config)# zone name BFA_100000051E419ACB_BLUN vsan 8
```

5. Enter the following command to add the zone members.

```
switch (config)# member pwwn [value]
```

where

pwwn—Port World Wide Name

value—Use the output from the **boot --blunZone** command. For example, from the output example shown in Step 3, you would use the following commands.

```
switch (config-zone)# member pwwn 00:00:00:00:50:00:00:05
switch (config-zone)# member pwwn 00:00:00:01:1e:41:9a:ca
switch (config-zone)# member pwwn 00:00:00:02:DD:EE:FF:00
switch (config-zone)# member pwwn 00:00:00:03:09:AA:BB:CC
```

6. Save the zone configuration.

NOTE

The zone created is only an entity to store boot LUN data. There is no zone enforcement by the fabric. You must create a separate zone containing the adapter port and storage target port to ensure that the adapter port is able to see the target. For additional details on configuring zones and zone sets, refer the configuration guide for your Cisco switch.

Boot systems over SAN without operating system or local drive

This section provides generic procedures for using ISO 9660 (.iso) optical disk images to boot host systems that do not have an installed operating system or local drive. Once you boot the host system, you can use BCU commands to update the boot code on installed adapters if necessary, configure BIOS to boot over SAN, and install the operating system and driver to a remote boot LUN.

Use one of the following ISO images for your system:

- LiveCD (live_cd.iso) that you can download from the QLogic Web Site using the following steps.
  1. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
  2. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
  3. Click the **Boot Code** link at the top of the page to direct you to the boot code files.
  4. Locate the **Multi-Boot Firmware LiveCD** link for your adapter in the table, click on it, and following the instructions.
- WinPE ISO image that you can create for x86 and x64 platform. You can use a WinPE image to boot UEFI-based systems. To create these images, refer to “Creating a WinPE image” on page 242.

For more detailed procedures to create a bootable CD or USB drive from the ISO image, refer to documentation for your CD or USB drive burning software. As an example of open source USB burning software for bootable Live USB drives, refer to http://unetbootin.sourceforge.net. For details on booting your operating system from a CD, DVD, or USB drive, refer to your host system documentation and online help.

Using a LiveCD image

The following procedures assume that the QLogic BR-Series Adapter has been installed in the host system.

1. For BIOS-based systems, obtain the LiveCD image from the QLogic Web Site using the following steps.
   a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
   b. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column, and then click **Go**.
   c. Click the **Boot Code** link at the top of the page to direct you to the boot code files.
   d. Locate the **Multi-Boot Firmware LiveCD** link for your adapter in the table, click on it, and following the instructions.

   NOTE

   For UEFI-based systems, create a WinPE image for your system using steps under “Creating a WinPE image” on page 242.

2. Create a bootable CD or USB drive using the ISO image. Refer to the documentation for your CD or USB drive burning software for details. As an example of open source USB burning software for bootable Live USB drives, refer to http://unetbootin.sourceforge.net.
3. Install the CD into the CD/DVD ROM drive or USB drive into a USB port and boot the system.
4. When self-testing completes, access you system’s boot manager menu and select the option to boot from the appropriate CD or USB drive.
5. Follow on-screen prompts and instructions to boot from the CD or USB drive.
6. Access your system’s command shell so that you can use BCU commands. (Refer to “Using BCU commands” on page 93 for more information.)
7. To update adapter boot code, refer to steps under “Updating boot code with BCU commands” on page 192.
8. To configure boot from SAN on an installed adapter, refer to “Configuring boot over SAN” on page 211 and “Configuring BIOS with HCM or BCU commands” on page 254.

9. To install the operating system and driver to a remote boot LUN, refer to “Configuring boot over SAN” on page 211 and “Operating system and driver installation on boot LUNs” on page 217.

Creating a WinPE image

Microsoft Windows Preinstallation Environment (Windows PE) is a bootable tool that provides minimal operating system features for installation, troubleshooting. and recovery. Please refer to the *Microsoft Preinstallation Environment User's Guide* for more information about Windows PE.

You can customize WinPE to boot a diskless host system (system without a hard disk or operating system) that contains QLogic BR-Series Fibre Channel adapters and accomplish the following tasks.

- Update the firmware and BIOS/EFI images in the adapter. The adapter tools and utilities bundled in the driver aid in updating the adapter flash.
- Install preconfigured Windows system images from a network share onto new computers that access the storage through QLogic BR-Series Adapters.

Use the following procedures to create a WinPE image that includes the QLogic driver package and utilities for your system.

1. Download Windows Automated Installation Kit (WAIK) for Windows 7® from the Microsoft Web Site. This kit is in .ISO format.
2. Create a bootable CD or USB drive from this image using appropriate burning software and install WAIK on your local system where you will create the WinPE image.
3. Determine the appropriate adapter driver package for your operating system and host platform using information in “Software installation and driver packages” on page 81.

   The WinPE image creation is based on the Vista kernel. Therefore, use the driver package for Windows Server 2008 R2 or later.
4. Download the latest Windows Server 2008 R2 driver package for your host platform from the QLogic Web Site using the following steps.
   a. Go to the QLogic Web Site at http://driverdownloads.qlogic.com and select **Adapters**, **by Model**.
   b. In the table, select the adapter type in first column, the adapter model in the second column, the operating system in the third column (Windows 2008 R2 or later), and then click **Go**.
   c. Click the **Drivers** link at the top of the page to direct you to the boot code files.

d. Locate the **Multi-Boot Firmware LiveCD** link for your adapter in the table, click on it, and following the instructions.

This package contains the script build_winpe.bat, which you will use to create the customized WinPE image.

5. Double-click the driver package and extract to a folder (such as C:\temp) on your local system. The build_winpe.bat script will be located under the *util* sub-directory.
6. Go to *C:\temp\util* and enter the following command to create the WinPE iso image.

```
build_winpe.bat
```

7. Burn the ISO image into a CD or USB drive using appropriate software.

Updating Windows driver on adapter used for boot over SAN

When updating the driver on Windows Server 2008 R2 systems where the adapter is used for booting over SAN, install the new adapter driver without removing the existing driver. This is the recommended procedure to update drivers. If you remove the adapter driver (which requires a system reboot because the adapter was modified) then reinstall the driver, installation will fail because the operating system cannot update the driver while a system reboot is pending. However, if you reboot the system after removing the driver, the operating system will not come up because the driver accessing the operating system was removed.

Using VMware Auto Deployment to boot QLogic custom images

VMware Auto Deployment for ESXi 5.0 leverages the default boot ROM to chain-load gPXE, which will then use HTTP to transfer the ESXi 5.0 image and host profile data from the auto deploy server. gPXE (formerly Etherboot) is an open source Preboot Execution Environment (PXE) implementation and bootloader. The traditional PXE clients use TFTP to transfer data, but gPXE adds the ability to retrieve data through other protocols like HTTP, iSCSI, and ATA over Ethernet (AoE).

You can configure PXE boot from QLogic CNAs and Fabric Adapter ports for CNA or NIC mode using “Network boot” on page 193.

For additional information on gPXE and on configuring and installing VMware Auto Deployment, refer to following resources:

- http://etherboot.org/wiki/index.php
- Instructions for installing ESXi and using vSphere Auto Deploy on the vSphere 5 Documentation Center.

For procedures to build custom images from QLogic BR-Series Adapter online and offline software bundles for auto deployment, refer to Building a custom image for auto deployment or ISO image.

Building a custom image for auto deployment or ISO image

Use the following information to build a custom image from the QLogic BR-Series Adapter online and offline bundles for auto deployment to export to an ISO image. For information on VMware auto deployment, refer to Using VMware Auto Deployment to boot QLogic custom images.

Note that the following procedure employs host profiles. Although they are not needed to boot ESX through auto deployment, they help maintain consistent configuration settings for ESX hosts and are a necessary part of auto deploy or stateless ESX because settings need persisted across reboots. Host profiles are required if you are changing adapter driver configuration settings from the default.

QLogic's ESXi 5.0 host profile plug-in support is documented in the following VMware Knowledge Base article:

http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=2001844

1. Obtain the online or offline bundle using one of the following methods:
   - Download the QLogic adapter driver CD from downloads.vmware.com. Search for "VMware ESXi 5.x driver for Brocade HBAs" (version 3.2.4).

     The driver offline bundle zip file is included in the CD contents as `BCD-[bfa/bna]-[release ver]-offline_bundle[build number].zip`. Save the file into a directory on your system.

     You can also download ESXi offline bundles from the following location: http://driverdownloads.qlogic.com.
2. Connect to the vSphere Virtual Center.

   ```
   Connect-VIServer -Server server_name -User administrator
   -Password password
   ```

3. Add the VMware ESX software depot. Use the command format of **Add-EsxSoftware Depot <directory location> <zip file name>** and add the storage driver (bfa), network driver (bna), host profile, and BCU plugin. Refer to the following examples:

```
Add-EsxSoftwareDepot
C:\BCD-bfa-<version>-00000-offline_bundle-564849.zip

Add-EsxSoftwareDepot
C:\BCD-bna-<version>-00000-offline_bundle-564849.zip

Add-ESXSoftwareDepotC:\Brocade-esx-5.0.0.0-bfaConfig-<version
>-offline)bundle-563502.zip

Add-EsxSoftwareDepot C:\Bcu_esx50_<version>.zip
```

4. Create a new image profile by cloning the standard ESXi 5.0 image profile.

```
new-esximageprofile -cloneprofile
ESXi-5.0.0-469512-standard-* -name "Brocade_<version>"
```

5. Add the QLogic software to the cloned image.

```
add-esxsoftwarepackage -imageprofile Brocade_<version>-03
-softwarepackage scsi-bfa, net-bna, brocade-esx-bcu-plugin,
hostprofile-bfaConfig
```

6. Verify VIBs are added to the image profile.

```
get-esximageprofile Brocade_<version>.VibList
```

7. If you are going to auto deploy the image, use the following commands to associate a deploy rule with the image profile.

   The following command creates a rule that assigns the image profile to all hosts.

```
New-DeployRule -Name "Brocade_<version>-03-Boot" -Item
"Brocade_<version>-03" -AllHosts
```

   The following command adds the deploy rule to the rule set.

```
Add-DeployRule -DeployRule "Brocade_<version>-03-Boot"
```

8. If you are going to export the image to an ISO image, use the following command:

```
Export-EsxImageProfile -ImageProfile Brocade_<version>"
-FilePath C:\vsphere5\customimage.iso -ExportToIso
```

9. To further customize your to deployment, refer to *vSphere Installation and Setup* for vSphere and ESXi 5.0.

Configuring BIOS with the BIOS Configuration Utility

Use the BIOS Configuration Utility on Legacy BIOS systems or UEFI-capable systems in Legacy BIOS mode to configure boot over SAN options, port speed, and boot delay, and to display adapter properties such as the BIOS version, PWWN, and NWWN.

NOTE

"BIOS configuration utility" and "BIOS configuration menu" are used interchangeably in this manual.

To configure BIOS parameters using the BIOS Configuration Utility, use the following steps.

NOTE

When you change a setting on a BIOS Configuration Utility screen, the setting is saved to the adapter whenever you change to a new screen or close the utility.

1. Power on the host system.
2. Watch the screen as the system boots. When “BIOS configuration utility” displays, press ALT+B or CTRL+B.

   The BIOS Configuration Menu displays a list of installed adapter ports, similar to the screen in Figure 4-6.

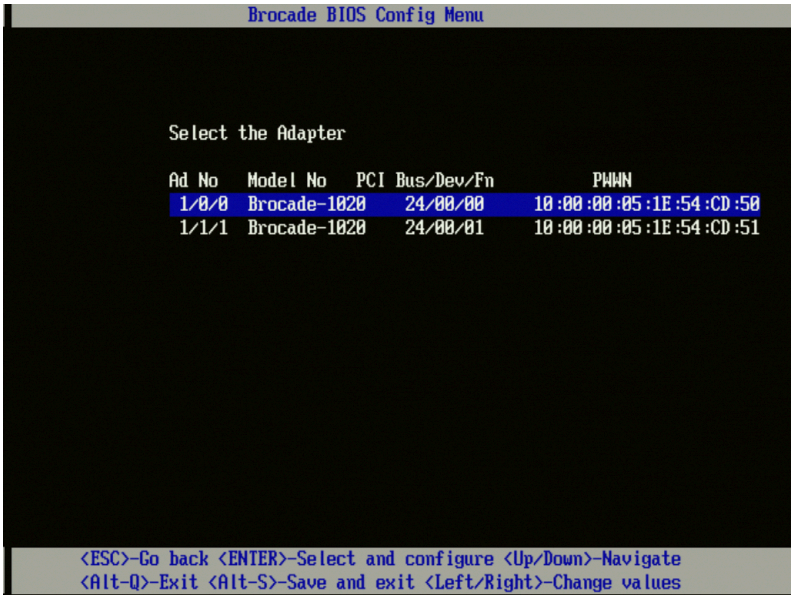


Figure 4-6. BIOS Configuration Menu (Select the Adapter)

Under the **Ad No** column, 1/0 and 1/1 are the first port and second port respectively on the first installed adapter while 2/0 and 2/1 are the first and second port on the second installed adapter.

A maximum of 8 ports can display on a screen, and a maximum of 16 ports are supported by the BIOS Configuration Utility. Select **Page Up** to go to a previous screen or **Page Down** to go to the next screen.

NOTE

To bypass functions and stop loading BIOS for a specific port, you must to press **x** for the port. to bypass functions and stop loading BIOS on all ports, press **X**. Press **x** or **X** within 5 seconds to bypass execution of functions displayed on screens. If you press after 5 seconds, the next function (instead of the current function) will be bypassed.

3. Select a port that you want to configure.

   A screen similar to the one in Figure 4-7 displays. (In the following illustration, port 0 on the BR-1020 CNA was selected.)

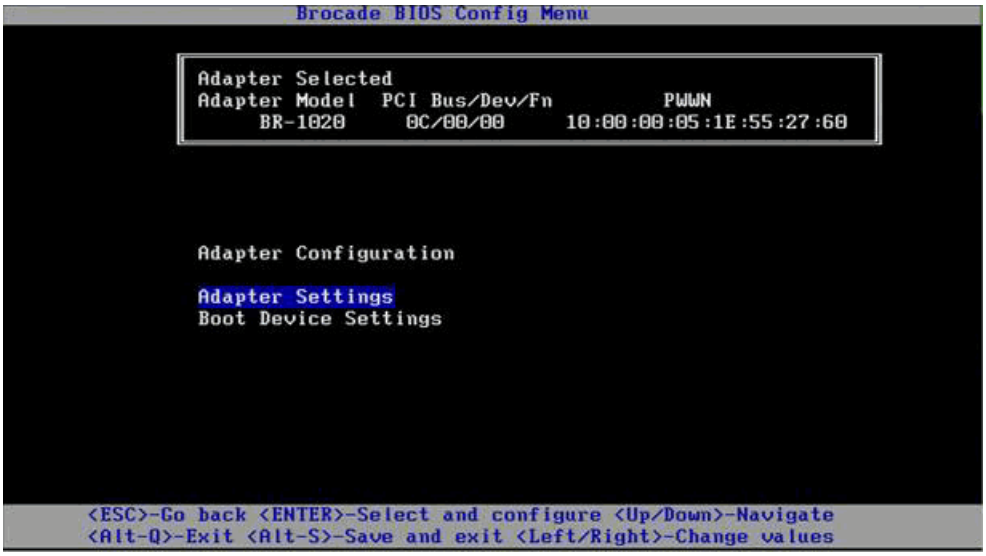


Figure 4-7. BIOS Configuration Menu (Adapter Configuration)

4. Select one of the following:

   - **Adapter Settings.** Use the Adapter Settings screen to enable BIOS, adapter port speed (HBAs and Fabric Adapter ports configured in HBA mode only), and discovery of boot LUN information from the fabric. You can determine adapter N and PWWN. Proceed to Step 5.
   - **Boot Device Settings**. Use the Device Settings screen to select the boot target and LUN for booting the host system. Proceed to Step 7.

5. Select **Adapter Settings** and press **Enter** to begin adapter configuration.

   A screen similar to that shown in Figure 4-8 displays showing the port's current BIOS version, NWWN, PWWN, and MAC (CNAs and Fabric Adapter ports configured in CNA mode only). Table 4-1 explains options available for BIOS, port speed, and boot LUN settings.

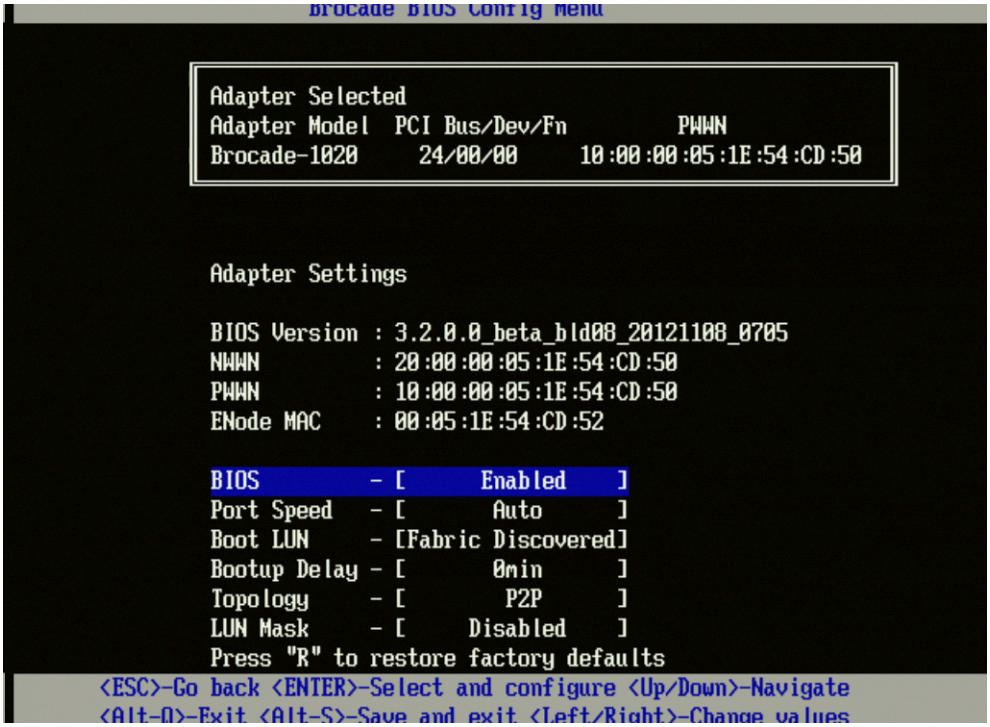

Brocade BIOS Config Menu
Adapter Selected
Adapter Model PCI Bus/Dev/Fn PWWN
Brocade-1020 24/00/00 10:00:00:05:1E:54:CD:50
Adapter Settings
BIOS Version : 3.2.0.0_beta_bld08_20121108_0705
NWWN : 20:00:00:05:1E:54:CD:50
PWWN : 10:00:00:05:1E:54:CD:50
ENode MAC : 00:05:1E:54:CD:52
BIOS - [Enabled]
Port Speed - [Auto]
Boot LUN - [Fabric Discovered]
Bootup Delay - [0min]
Topology - [P2P]
LUN Mask - [Disabled]
Press "R" to restore factory defaults
<ESC>-Go back <ENTER>-Select and configure <Up/Down>-Navigate
<Alt-O>-Exit <Alt-S>-Save and exit <Left/Right>-Change values

Figure 4-8. BIOS Configuration Menu (Adapter Settings)

Table 4-1. BIOS Configuration Utility field descriptions

Field	Description
BIOS	The value of BIOS must be *Enable* for the selected adapter port to support boot over SAN. If this setting is set to Disable, the system will not boot from the Fibre Channel disk drives that are connected to the selected adapter port. **NOTE** The default setting for all adapter ports is Enable.
BIOS Version	Displays the BIOS boot code version installed on the card.
Boot LUN	■ Fabric Discovered. When enabled, LUN information, such as the location of the boot LUN, is provided by the fabric (refer to "Fabric-based boot LUN discovery" on page 234). ■ Flash Values. Boot LUN information will be obtained from flash memory. Note that values are saved to flash when you configure and save them through the BIOS Configuration Utility and BCU. ■ First LUN. The host boots from the first LUN visible to the adapter that is discovered in the fabric. **NOTE** To boot from direct-attached Fibre Channel targets, you must use the **First LUN** or **Flash Values** options. **NOTE** Fabric-based boot LUN discovery (Fabric Discovered) is not supported for booting from direct-attached targets.
Bootup Delay	You can configure values of 1, 2, 5, and 10 minutes. This adds a delay in discovering the boot LUN to help compensate for the time it takes storage systems to boot up. During storage system boot, boot LUNs are not visible to servers that are also booting up.
NWWN	Displays the port's Node World-Wide Name.
PWWN	Displays the port's unique Port World-Wide Name.
MAC	Displays the port's Media Access Control (MAC) address for CNAs and Fabric Adapter ports configured in CNA or NIC mode.
Port Speed	Sets the speed for the adapter port. **NOTE** Auto allows the adapter port to automatically negotiate link speed with the connected port.
Port Topology	Set *Loop* if the port is connecting to storage in a Fibre Channel Arbitrated Loop (FC-AL) and *P2P* if the port is connecting to storage in a point-to-point topology.

6. Change any parameters by following the instructions at the bottom of the BIOS Configuration Utility screen. For example, use the following keys to select and change information:

   - Up and Down keys - Scroll to a different field.
   - ENTER - Select a field and configure values.
   - Left and Right arrow keys - Change a value.
   - ALT-S - Save configuration values to adapter flash memory.
   - ALT-Q - Exit the utility.
   - ESC - Go back a screen.
   - Page Up or Page Down - Go to preceding or next screen.

NOTE

To restore factory default settings, press **R**.

7. To configure boot devices, select **Boot Device Settings** from the initial menu screen for the adapter port (Step 4) and press **Enter** to designate a discovered LUN as a boot device.

   A list of up to four boot devices displays, showing the PWWN of the storage port and the LUN number designated as a boot LUN. The first device listed is the primary boot device. The host first tries to boot from the primary device, and then the succeeding devices in the list. Figure 4-9 shows an example of the Boot Devices settings.

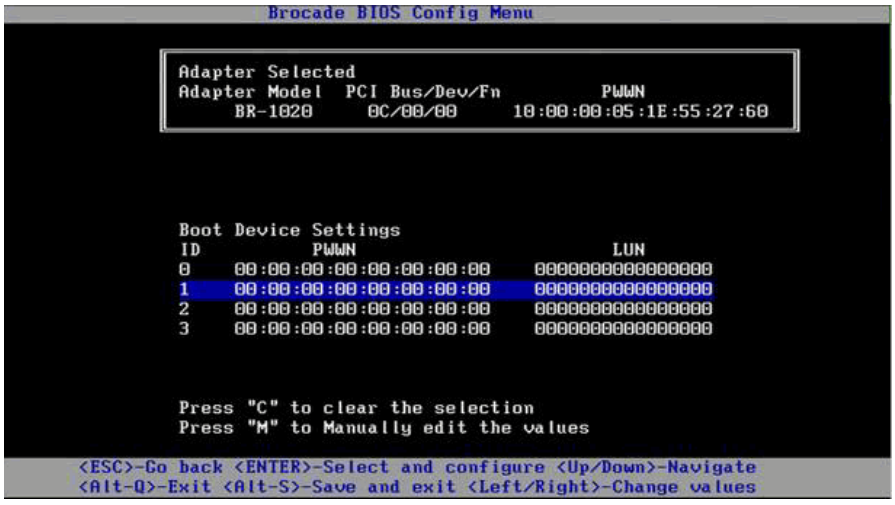

Brocade BIOS Config Menu
Adapter Selected
Adapter Model PCI Bus/Dev/Fn PWWN
BR-1020 0C/00/00 10:00:00:05:1E:55:27:60
Boot Device Settings
ID PWWN LUN
0 00:00:00:00:00:00:00:00 0000000000000000
1 00:00:00:00:00:00:00:00 0000000000000000
2 00:00:00:00:00:00:00:00 0000000000000000
3 00:00:00:00:00:00:00:00 0000000000000000
Press "C" to clear the selection
Press "M" to Manually edit the values
<ESC>-Go back <ENTER>-Select and configure <Up/Down>-Navigate
<Alt-Q>-Exit <Alt-S>-Save and exit <Left/Right>-Change values

Figure 4-9. BIOS Configuration Menu (Boot Device Settlings)

8. Use the Up and Down arrow keys to select a boot device, and then use one of the following options to configure boot device settings:

   - Press **C** to clear a selected boot device from the list.
   - Press **M** to manually edit boot device information, and then enter the PWWN and LUN values for the boot device. Press **M** to exit.

     NOTE

     When editing boot device information, you must complete the entire value before pressing **M** or the configuration will reset to the previous value. For example, if you edit part of a PWWN, and then press **M**, the PWWN will return to the previous value.

   - Select a device and press **Enter**. This displays additional screens that allow you to select discovered LUNs as boot devices.

   If you select a device under Boot Device Settings and press **Enter**, a screen similar to the one in Figure 4-10 displays listing all discovered boot targets.

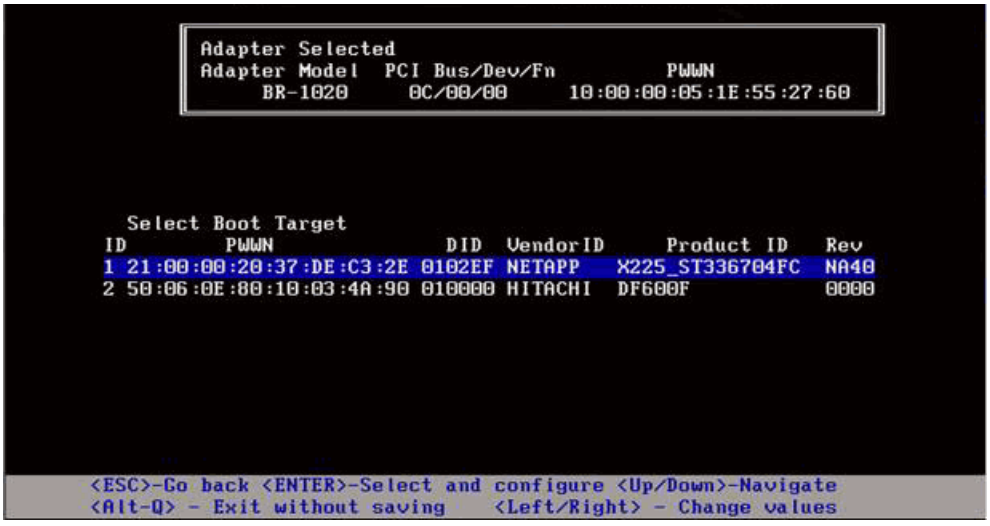


Figure 4-10. BIOS Configuration Menu (Select Port Target)

9. Select a target on which you want to designate a boot LUN and press **Enter**.

   A screen similar to the one in Figure 4-11 displays listing device information and LUNs visible to the adapter.

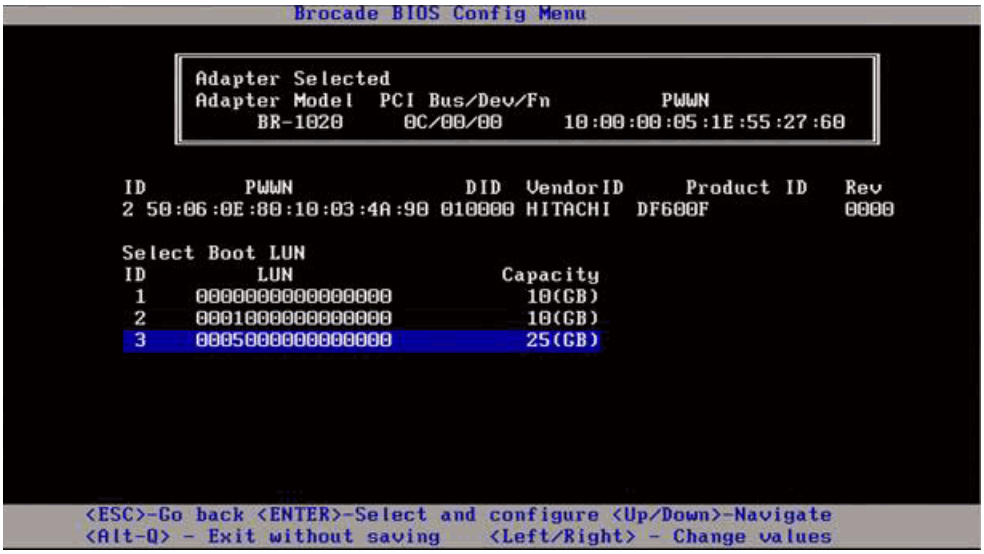

Brocade BIOS Config Menu
Adapter Selected
Adapter Model PCI Bus/Dev/Fn PWWN
BR-1020 0C/00/00 10:00:00:05:1E:55:27:60
ID PWWN DID VendorID Product ID Rev
2 50:06:0E:80:10:03:4A:90 010000 HITACHI DF600F 0000
Select Boot LUN
ID LUN Capacity
1 0000000000000000 10(GB)
2 0001000000000000 10(GB)
3 0005000000000000 25(GB)
<ESC>-Go back <ENTER>-Select and configure <Up/Down>-Navigate
<Alt-Q> - Exit without saving <Left/Right> - Change values

Figure 4-11. BIOS Configuration Menu (Select Boot LUN)

10. Select the LUN on the target device that you want to designate as the boot LUN for the host. This must be the same LUN that you bound to the adapter port using the storage system's management or configuration utility (refer to Step 6 under "Procedures" on page 213).

NOTE

You only need to select the bootable LUN once. After the first boot, the same LUN will be used until changed through the BIOS Configuration Utility.

11. Press **Enter**. The selected device will be added to the list of boot devices for the adapter on the Boot Device Settings screen (Figure 4-12.

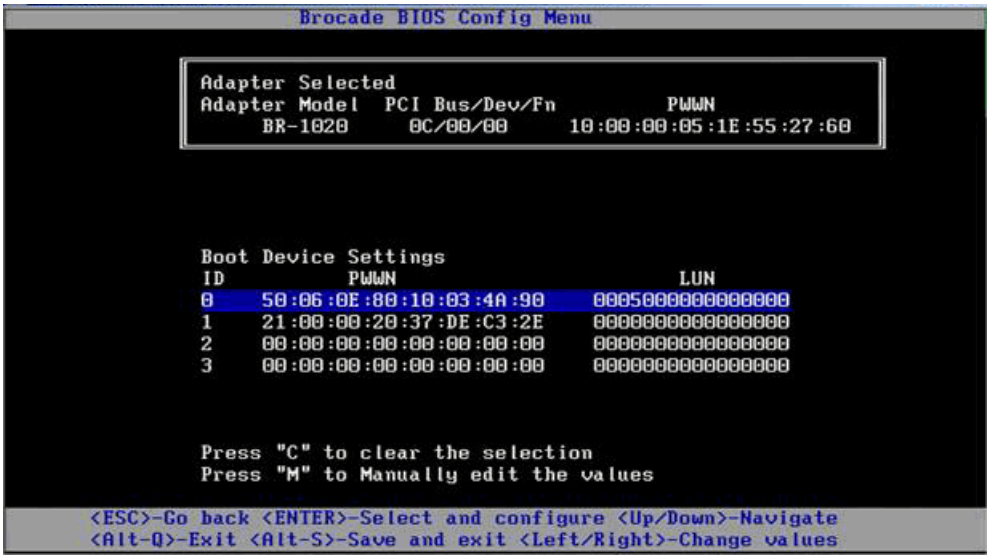

Brocade BIOS Config Menu
Adapter Selected
Adapter Model PCI Bus/Dev/Fn PWWN
BR-1020 0C/00/00 10:00:00:05:1E:55:27:60
Boot Device Settings
ID PWWN LUN
0 50:06:0E:80:10:03:4A:90 0005000000000000
1 21:00:00:20:37:DE:C3:2E 0000000000000000
2 00:00:00:00:00:00:00:00 0000000000000000
3 00:00:00:00:00:00:00:00 0000000000000000
Press "C" to clear the selection
Press "M" to Manually edit the values
<ESC>-Go back <ENTER>-Select and configure <Up/Down>-Navigate
<Alt-Q>-Exit <Alt-S>-Save and exit <Left/Right>-Change values

Figure 4-12. BIOS Configuration Menu (Boot Device Settings)

12. Save or exit the configuration utility.
    - To save the configuration, press ALT+S.
    - To exit without saving, press the ALT+Q.

Configuring BIOS with HCM or BCU commands

Using BCU commands and HCM, you can perform the following tasks:

- Enable or disable BIOS for booting over the SAN
- Set port speed for HBAs and Fabric Adapter ports configured in HBA mode
- Select the boot option (auto, flash, first visible LUN)
- Set bootup delay
- Display BIOS configuration parameters
- Select boot LUNs

NOTE

You can only designate bootable devices (LUNs) using the Boot Device Settings feature of the BIOS Configuration Utility,

For detailed information on using BCU commands, refer to the **bios** section of the "QLogic BCU CLI" appendix in the *QLogic BR Series Adapter Administrator's Guide.*

For detailed information on using HCM, refer to the "Boot Over SAN" section of the" Adapter Configuration" chapter in the *QLogic BR Series Adapter Administrator's Guide*.

Configuring UEFI

For UEFI systems or UEFI boot mode, use general steps in this section to configure boot over SAN and other adapter functions using your system's UEFI setup screens. Note that this section provides *general* steps for adapter configuration options on "storage" and "network" menus, however location of these options vary depending on your host system. On some systems, options to configure HBA ports or Fabric Adapter ports configured in HBA mode my be on UEFI "storage" configuration screens. Options to configure CNA ports or Fabric Adapter ports configured in NIC or CNA mode may be located on UEFI "network" configuration screens. On some systems, options may be located in locations other than storage or network configuration screens. Refer to your system's documentation or online help for details on using your UEFI setup screens.

For instructions on configuring PXE boot with your system's UEFI setup screens, refer to "Configuring network boot" on page 196.

NOTE

When you change a setting on a UEFI setup screen, the setting is saved to the adapter whenever you change to a new screen within the adapter configuration or when you close the utility. Changes are effective even before you explicitly save them.

Using Network menu options

Use the following steps to configure adapter functions using UEFI network menu options.

NOTE

Options to configure the port mode and create and manage VNICs are only supported on QLogic Fabric Adapters for specific ports (0 or 1) when configuring from UEFI setup storage and network menus. Refer to Table 12 for details. Appropriate SFP (FC or 10 GbE) transceiver and driver packages must be installed to operate the port in the selected mode.

1. Power on the host system.
2. Access your system setup, hardware setup, or hardware management menus. Depending on your system, you may access these menus by booting the system and pressing the **F2** key (Dell systems) or **F1** key (IBM systems) when prompted for configuration or setup.
3. Access network screens to configure installed devices.
   - For example, for IBM systems, access the **Network** menu option on the **System Settings** screen.
   - For example, for Dell systems, access the **Network Settings** screen from the **Lifecycle Controller (LC) Settings > Network Settings** screen.
4. From the list of installed network devices, select and adapter and port that you want to configure.

   NOTE

   QLogic CNA ports or Fabric Adapter ports configured in CNA or NIC mode appear as individual network interface cards (NIC) to your host system.

5. Access the port configuration screen for the port and configure the following options:
   - To enable UEFI for boot over SAN, enable **FCoE Offline Mode**. You can then select the installation boot file using the **Boot Manager** screens.
   - Change the port mode by selecting **Configured Port Mode** and selecting HBA, CNA, or NIC.

     The **Active Port Mode** is a read only field which displays current port mode as CNA, HBA or NIC and will display configured port mode after power cycle the host system.

     NOTE

     Depending on your host system, you may be able to change only supported port operating modes.

6. Access the VNIC configuration screen for the port to perform the following tasks:
   - Create VNICs - Allows you to create a VNIC with specified bandwidth. Make sure that the sum of all minimum bandwidth across a port is less than or equal to 100 percent.
   - Manage VNICs - Select an existing VNIC to change the minimum and maximum bandwidth, and display the VNIC's MAC address and PCI device ID.

   For more information on VNICs and creating VNICs, refer to "I/O virtualization" on page 28.
7. Save your settings and exit the utility.

Using Storage menu options

Use the following steps to configure adapter functions using UEFI setup utility Storage menu options.

1. Power on the host system.
2. Access your system setup, hardware setup, or hardware management menus. Depending on your system, you may access these menus by booting the system and pressing the **F2** key (Dell systems) or **F1** key (IBM systems) when prompted for configuration or setup.
3. Access storage screens to configure installed devices.
   - For example, for IBM systems, access the **Storage** menu option on the **System Settings** screen.
   - For example, on Dell servers, after pressing **F2** to display the **System Setup Main Menu**, access the **Device Settings** menu to configure adapter functions.
4. From the list of installed network devices, select the QLogic BR-Series Adapter and port that you want to configure.
5. To enable UEFI for boot over SAN, select **Port Enabled**. You can then select the installation boot file using the **Boot Manager** screens.
6. Change the port mode by clicking the **Configured Port Mode** and selecting HBA, CNA, or NIC.

   The **Active Port Mode** displays the current mode as CNA, HBA, or NIC and will display the configured port mode after you power-cycle the host system.

Options to configure the port mode are only supported on QLogic Fabric Adapters for specific ports (0 or 1). Refer to Table 4-2 on page 259 for details. Appropriate SFP (FC or 10 GbE) transceiver and driver packages must be installed to configure and operate the port in a specific mode.

NOTE

Depending on your host system, you may be able to change only supported port operating modes.

7. Set the **Port Speed**. Available options depend on the installed adapter. The **Auto Select** option allows the adapter port to automatically negotiate link speed with the connected port.

   Port speed options are only applicable to HBAs or Fabric Adapter ports configured in HBA mode.CNAs or Fabric Adapter ports configured in CNA or NIC mode are set to **Auto Select**.

8. Set the **Port Topology** to one of the following:

   - **Loop** for Fibre Channel Arbitrated Loop (FC-AL) topology
   - **P2P** for point to point (**P2P**) topology

9. Determine **LUN Mask**. state.

   LUN Mask displays the enabled or disabled status of LUN masking for the port. Enable or disable LUN masking using BCU commands or HCM. For more information on LUN masking, refer to the LUN Masking paragraph under “Host bus adapter features” on page 49.

10. Enable or disable the **QOS State**.

    This option is only applicable to Fabric Adapter ports configured in HBA mode. When enabled, you can set bandwidth percentages for high, medium and low priority. The sum of all bandwidths must be equal to 100 percent. Also, high priority bandwidth must be greater than medium priority bandwidth settings, and medium priority bandwidth must be greater than low priority bandwidth settings.

    For more information on QoS for HBA ports, refer to the Quality of Service (QoS) paragraph under “Host bus adapter features” on page 49.

Fabric Adapter configuration support

Options to configure the port mode and create and manage VNICs on QLogic Fabric Adapter ports are supported on specific ports (0 or 1) when configuring from UEFI storage and network menus. Refer to Table 4-2 for details.

Table 4-2. Fabric Adapter configuration support

Port 0 Mode	Port 1 Mode	Storage Menu		Network Menu			
		Change Port Mode?		Change Port Mode?		VNIC Management?	
		Port 0	Port 1	Port 0	Port 1	Port 0	Port 1
HBA	HBA	Yes	Yes	N/A[1]	N/A[a]	N/A[a]	N/A[a]
HBA	NIC	Yes	N/A[a]	N/A[a]	No	N/A[a]	No
HBA	CNA	Yes	Yes	N/A[a]	No	N/A[a]	No
NIC	HBA	N/A[a]	No	Yes	N/A[a]	Yes	N/A[a]
NIC	NIC	N/A[a]	N/A	Yes	Yes	Yes	Yes
NIC	CNA	N/A[a]	No	Yes	Yes	Yes	Yes
CNA	HBA	Yes	Yes	Yes	N/A[a]	Yes	N/A[a]
CNA	NIC	Yes	N/A[a]	Yes	Yes	Yes	Yes
CNA	CNA	Yes	Yes	Yes	Yes	Yes	Yes

1. Adapter configuration is not supported in UEFI setup screens.

IBM Agentless Inventory Manager (AIM) support

The IBM AIM framework queries updates the current HBA properties after the BOFM/UCM phase. The inventory information extracted from the HII database is translated to XML format by the AIM and the XML data is stored on the IMM. The information retrieved includes the QLogic BR-Series Adapter information about boot code, firmware versions and supported characteristics, PCI generic information, network, physical and logical port

Alternate methods for configuring UEFI

Depending on your UEFI-based host system, different tools may be available to perform the following tasks to configure the adapter values that are stored in adapter flash memory.

- Enable or disable adapter ports for boot over SAN.

  When enabled, available Fibre Channel devices attach as UEFI devices and obtain UEFI device names. Once the Fibre Channel devices have UEFI device names, you can select them in the systems Boot Configuration menu as boot devices.

- Set the port speed (HBAs and Fabric Adapter ports configured in HBA mode only).

  NOTE

  Autonegotiate is the only speed option for the 10 Gbps CNAs and Fabric Adapter ports configured in CNA or NIC mode.

- Select LUNs for booting over SAN.

Depending on your system, different tools may be available to obtain adapter and controller handle numbers that identify the appropriate adapter for configuration, enable adapter port(s), and change port speeds. The following examples use EFI shell commands. Refer to your system documentation and help system for details on these commands.

- On systems with EFI shell commands, you can use such commands as **drvcfg, dh**, and **drivers** to configure adapter values (an example procedure for these systems follows).
- On some systems, you can access **drvcfg** and other commands from a menu system to configure adapter values. Refer to instructions or online help provided for your system.
- On other systems, you will need to use BCU commands and the system's BIOS menus to configure adapter values. Refer to instructions or online help provided for your system. To use HCM options or BCU commands, refer to "Configuring BIOS with HCM or BCU commands" on page 254.

The following procedures provide an example for configuring adapter values on systems that support EFI shell commands.

1. Power on the host system.
2. When the EFI Boot Manager menu displays, select EFI Shell.

3. Enter the following EFI shell command to display the device or driver handle number for each driver loaded on the system.

   ```
   drivers -b
   ```

   Output displays one screen at a time and includes the two-digit driver handle number, version, and driver name. Look for entries labeled “QLogic Fibre Channel Adapter.” In the following example, the QLogic BR-Series Adapter has a driver handle of 25.

```
            T   D
D           Y  C I
R           P  F A
V  VERSION  E  G G  #D #C  DRIVER NAME                          IMAGE NAME
-------------------------------------------------------------------------------------------
25 0000000A D  X -   2   - QLogic Fibre Channel Adapter Bus D PciROM:03:00:00:003
```

4. Enter the following command to display all drivers and controllers that support the driver configuration protocol.

   ```
   drvcfg -c
   ```

   Once the driver initializes, look for entries for the QLogic BR-Series Adapter driver handle that you found in the previous step. In the following example, two controller handles (27 and 28) display for driver handle 25. Each controller represents a port on the adapter.

   ```
   Configurable Components
   Drv[1F]  Ctrl[20]  Child[67]  Lang[eng]
     Drv[25]  Ctrl[27]  Lang[eng]
     Drv[25]  Ctrl[28]  Lang[eng]
   ```

5. Configure an adapter port using the **drvcfg -s** command in the following format.

   ```
   drvcfg -s [driver handle] [controller handle]
   ```

   Following is an example of how to use this command with the driver and controller handles from the previous steps.

   a. To configure one of the adapter ports, enter the following:

      ```
      drvcfg -s 25 27
      ```

NOTE

The -s option for drvcfg provides prompts for setting adapter options. You can use the -v option (drvcfg -v 25 27) to check that options currently set on the adapter are valid.

b. When you are prompted to enable the adapter port, press the Y or N key to enable or disable the port.

c. When prompted, enter a port speed (HBAs and Fabric Adapter ports configured in HBA mode only).

d. To terminate and not save values that you have selected, press ESC, and go to the next step.

Following is example output from the **drvcfg** command using driver handle 25 and controller handle 27. Note that for a CNA and Fabric Adapter ports configured in CNA mode, an option to set the port speed will not display as it does for an HBA or Fabric Adapter port configured in HBA mode.

```
Set Configuration Options
Drv[25]  Ctrl[27]  Lang[eng]Bfa Fibre Channel Driver
Configuration
====================================
Port nwwn 200000051E301492
Port pwwn 100000051E301492
Enable Brocade Fibre Channel adapter/port 1/0  (Y/N)? [Y] -->Y
Set Brocade Fibre Channel Adapter Port Speed 1/0 (0,2,4,8)?
[Auto] -->Auto
Drv[25]  Ctrl[27]  Lang[eng] - Options set.  Action Required
is None
```

NOTE

Entering the **drvcfg** command with an -f option (drvcfg -f) sets adapter options to default values. For example, enter drvcfg -f 25 27. Entering the command with the -v option (drvcfg -v) checks whether options configured for the adapter are valid. For example, enter drvcfg -v 29 3F. You could configure the other adapter port using the drvcfg -s command by keeping the driver handle the same and using the other controller handle (drvcfg -s 25 28).

6. Execute a **reset** EFI shell command to reinitialize the system.

   When the system restarts, all available Fibre Channel devices display in map output as the EFI Shell initializes. SAN drives display with “Fibre” as part of the device name.

7. Find the LUN that you have targeted for boot over SAN in the system’s map output.

   Note that you can also enter the following EFI shell command to list all storage targets and LUNs visible to the adapter port. SAN drives display with “Fibre” as part of the device name.

   ```
   dh -d [controller handle]
   ```

8. Refer to procedures for your system’s **Boot Configuration** menu to verify that your host is configured to automatically boot from the target remote LUN.

9. Refer to instructions under “Operating system and driver installation on boot LUNs” on page 217 to install the host’s operating system and adapter driver to the LUN

UEFI Driver Health Check

Driver Health Protocol requires the following two services implemented:

- GetHealthStatus

  The GetHealthStatus service retrieves the health status for a controller that a driver is managing or a child that a driver produced. This service is not allowed to use any of the console I/O related protocols. Instead, the health status information is returned to the caller. The caller may choose to log or display the health status information.

- Repair

  The Repair service attempts repair operations on a driver-managed controller or a child, that the driver produced. This service is not allowed to use any of the console-I/O related protocols. Instead, the status of the repair operation is returned to the caller. The caller may choose to log or display the progress of the repair operation and the final results of the repair operation.

NOTE

The Driver Health Protocol module will be implemented in the UEFI bfa driver and UEFI bna driver.

Accessing UEFI driver health screen through IBM server

1. Enter the IBM server Setup.
2. Select the **System Settings** menu from the System Configuration and Boot Management screen.
3. From the menu displayed in the System Settings screen, select Driver Health option to display the Driver Health menu.

Figure 4-13 is an example of a driver health menu, displaying a list of the drivers installed on the system and their health status.

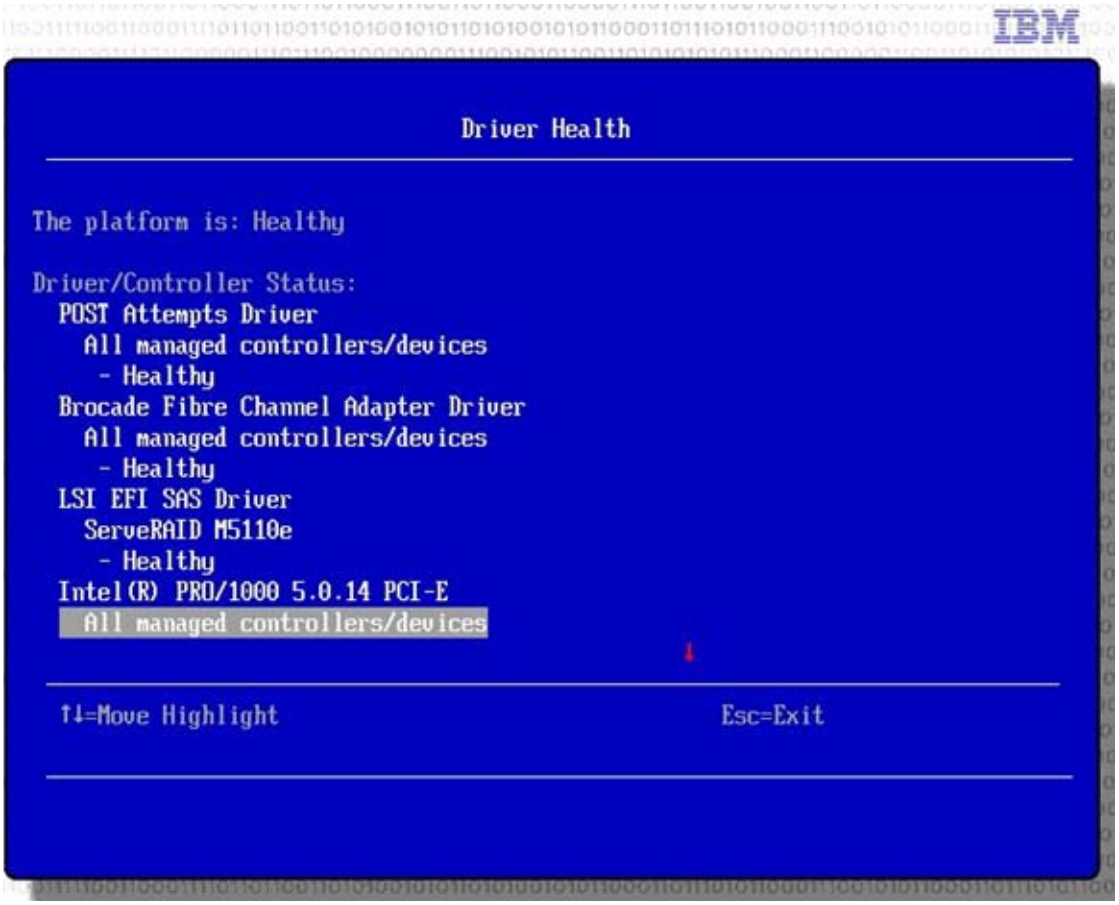


Figure 4-13. UEFI Driver Health Menu

5 Specifications

Fabric Adapters

The BR-1860 stand-up Fabric Adapters are low-profile MD2 form factor PCI Express (PCIe) cards, measuring 16.751 cm by 6.878 cm (6.595 in. by 2.708 in.). One and two-port models are available. Ports support 10 GbE, 8 Gbps FC, or 16 FC small form factor pluggable (SFP+) transceiver optics. With the appropriate optic installed, ports can be configured for HBA, CNA, or NIC operation using the AnyIO feature.

Fabric Adapters are shipped with two sizes of brackets for mounting in your host system. Table 5-1 lists the two bracket types and dimensions.

Table 5-1. Fabric Adapter mounting brackets

Bracket Type	Dimensions
Low Profile	1.84 cm by 8.01 cm (.73 in. by 3.15 in.)
Standard	1.84 cm by 12.08 cm (.73 in. by 4.76 in.)

PCI Express interface

Install QLogic stand-up adapters in PCI Express (PCIe) computer systems with an Industry Standard Architecture/Extended Industry Standard Architecture (ISA/EISA) bracket type.

Following are some of the features of the PCIe interface:

- PCI Gen 2 system interface.
- On-board flash memory provides BIOS support over the PCIe bus.
- The adapter is designed to operate on an x8 lane DMA bus master at 250 GMhz. Operation can negotiate from x8 to x4, x2, and x1 lanes.
- Effective data rate of 32 Gbps for Gen 2 and 16 Gbps for Gen 1.
- Eight physical functions supported per port.

- Single Root I/O Virtualization (SRIOV), which provides a total of 256 functions. This includes a maximum of 16 Physical Functions (PFs) and 255 Virtual Functions (VFs) for a dual-port adapter.
- Support for 2,000 MSI-X interrupt vectors.
- Support for INT-X.

PCI system values

All QLogic Fabric Adapters share a common PCI Vendor ID (VID) value to allow drivers and BIOS to recognize them as supported Fibre Channel and network devices. Adapters are also assigned PCI subsystem vendor IDs (SVIDs) and subsystem IDs (SSIDs) to allow drivers and BIOS to distinguish between individual host adapter variants. You can locate PCI device, vendor, and subsystem IDs for the installed Fabric Adapters through your host's operating system tools. For example, if using Windows, use the following steps.

1. Access the Device Manager
2. Open the Properties dialog box for the adapter by right-clicking the adapter and selecting **Properties** from the shortcut menu.
3. Select the **Details** and **Driver** tabs to locate specific values.

Hardware specifications

The adapter supports features and standards outlined in Table 5-2.

Table 5-2. Fabric Adapter hardware specifications

Feature	Description
Port speeds	■ 10.312 Gbps for installed 10GbE SFP transceiver ■ 16, 8, or 4 Gbps and auto-negotiated speeds per port for installed 16 Gbps Fibre Channel SFP transceivers ■ 8, 4, 2 Gbps, and auto negotiated speeds per port for installed 8 Gbps Fibre Channel SFP transceivers
SFP transceivers (stand-up adapters)	Ethernet ■ Multimode and single mode fiber optic small form factor pluggable plus (SFP+) transceivers ■ Copper SFP+ transceiver Fibre Channel ■ Multimode and single mode fibre optic SFP transceiver
Connectivity	■ Stand-up adapters - LC cable connectors

Table 5-2. Fabric Adapter hardware specifications (Continued)

Feature	Description
ASIC	■ Provides the Fibre Channel, FCoE, and DCB functionality for the adapter. ■ Two on-board processors, each operating at 400 MHz, which coordinate and process data in both directions. ■ Hardware acceleration for network and FCoE functions. ■ AnyIO technology for setting port operating modes to HBA (Fibre Channel), CNA, or NIC (Ethernet).
External serial FLASH memory	■ Stores firmware and adapter BIOS code ■ 4 MB capacity
Fibre Channel performance	500,000 IOPs (maximum) 1,000,000 IOPs per dual-port adapter
Data rate	■ 14.025 Gbps (1600 MB/sec) ■ 8.5 Gbps (800 MB/sec) ■ 4.25 Gbps (400 MB/sec) ■ 2.125 Gbps (200 MB/sec) Auto-sensing (per port), full duplex.
Ethernet performance	10.312 Gbps throughput per port Line rate performance for 700-byte packets. Low latency: receive 1.5us, transmit 2us.
Topology	Ethernet - 10 Gbps DCB Fibre Channel - Point-to-Point (N_Port) Fibre Channel - Switched Fabric (N_Port) Fibre Channel Arbitrated Loop (FC-AL)
Data protection	Cyclic redundancy check (CRC) on PCIE and line-side links ECC within the ASIC memory blocks (2-bit detection and 1-bit correction) Error correction code (ECC) and parity through the ASIC

Table 5-2. Fabric Adapter hardware specifications (Continued)

Feature	Description
Supported Ethernet features and standards	■ 803.3ae (10 Gbps Ethernet) ■ 802.1q (VLAN) ■ 802.1q (tagging) ■ 802.1P (tagging) ■ 802.1Q (VLAN) ■ 802.1Qbb (priority flow control) ■ 802.1Qau (congestion notification) ■ 802.1Qaz (enhanced transmission selection) ■ 802.1AB (Link Layer Discovery Protocol) ■ 802.3ad (link aggregation) ■ 802.1p (priority encoding) ■ 802.3x (Ethernet flow control) ■ 802.3ap - KX/KX4 (auto negotiation) ■ 802.3ak - CX4 ■ PXE (Preboot Execution Environment) ■ UNDI (Universal Network Device Interface) ■ NDIS (Network Data Interface Specification) 6.2 ■ Dell iSCSI DCB ■ EEE 1149.1 (JTAG) for manufacturing debug and diagnostics. ■ IP/TCP/UDP Checksum Offload ■ IPv4 Specification (RFC 791) ■ IPv6 Specification (RFC 2460) ■ TCP/UDP Specification (RFC 793/768) ■ ARP Specification (RFC 826) ■ Data Center Bridging (DCB) Capability ■ DCB Exchange Protocol (DCBXP) 1.0 and 1.1 ■ RSS with support for IPV4TCP, IPV4, IPV6TCP, IPV6 hash types ■ Syslog ■ SRIOV

Table 5-2. Fabric Adapter hardware specifications (Continued)

Feature	Description
Supported Ethernet features and standards (continued)	■ Jumbo frames ■ Interrupt coalescing ■ Interrupt moderation ■ Multiple transmit priority queues ■ Network Priority ■ Large and small receive buffers ■ TCP Large Segment Offload ■ Unicast MAC address ■ MAC filtering ■ Multicast MAC addresses ■ Multiple transmit queues for Windows and Linux ■ SNMP (Windows and Linux) ■ Team VM queues ■ IEEE Virtual Bridged Local Area Networks (VLAN) ■ VLAN discovery using proprietary logic and for untagged/priority-tagged FIP frames ■ VLAN filtering ■ VMware NetIOC ■ VMware NetQueues v3 (VMware 4.1 and later) ■ VMware multiple priority levels ■ VNIC ■ DCB Capability Exchange Protocol Base Specification

Table 5-2. Fabric Adapter hardware specifications (Continued)

Feature	Description
Supported FCoE features and standards	■ LKA (Link Keep Alive) protocol ■ Look ahead split ■ preFIP, FIP 1.03, and FIP 2.0 (FC-BB5 rev. 2 compliant) ❑ FIP discovery protocol for dynamic FCF discovery and FCoE link management. ❑ FPMA and SPMA type FIP fabric login. ■ FCoE protocols ❑ FC-SP ❑ FC-LS ❑ FC-GS ❑ FC-FS2 ❑ FC-FDMI ❑ FC-CT ❑ FCP ❑ FCP-2 ❑ FCP-3 ❑ FC-BB-5 ■ FCoE checksum offload ■ SCSI SBC-3 ■ NPIV ■ Target rate limiting ■ Boot Over SAN (including direct-attached) ■ Fabric-Based Boot LUN Discovery ■ Persistent binding ■ I/O interrupt coalescing and moderation ■ Class 3, Class 2 control frames

Table 5-2. Fabric Adapter hardware specifications (Continued)

Feature	Description
Fibre Channel features and standards	■ SCSI over FC (FCP) ■ FCP2 ■ FCP3 ■ FC-SP Authentication ■ NPIV ■ Quality of Service (QoS) ■ Target rate limiting ■ Boot over SAN ■ Fabric-Based Boot LUN Discovery ■ I/O Interrupt Coalescing ■ T10 Data CRC ■ Multiple Priority (VC_RDY) ■ Frame-Level Load Balancing ■ Persistent Binding per Channel ■ Fabric-Based Configuration ■ vHBA ■ Fibre Channel Framing and Signaling Interface (FC-FS) ■ Fibre Channel - Methodologies for Interconnects (FC-MI) ■ SCSI Architecture Model - 2 ■ Private Loop SCSI Direct Attach (FC-PLDA). ■ Fibre Channel Backbone (FC-BB-5) ■ Fibre Channel Backbone-(FC-BB-5) - FIP (1.03) dpANS ■ BB_Credit error recovery ■ D_Port (diagnostics port) ■ Forward error recovery (FEC) ■ Target reset control

Table 5-2. Fabric Adapter hardware specifications (Continued)

Feature	Description
Other adapter features and standards	■ ASIC Flip-flops Parity Protected ■ T10 Data CRC ■ ECC Memory Parity Protected ■ PCI-Express Base Specification ■ PCI-Express - Root Complex Discovery Topology ■ PCI-Express Reset Limit Adjustment ■ Errata for PCI-Express Base Specification, Rev 1.0a.

Cabling (stand-up adapters)

This section describes cabling specifications for Fabric Adapters.

Table 5-3 lists the supported cabling for Ethernet transceivers for stand-up adapters.

Table 5-3. GbE transceiver cable specifications

Transceiver	Cable	Minimum Length	Maximum Length
Ethernet 10 Gbps SR (short range) SFP+ 1490 nm	OM1 - 6.25/125 multimode OM2 - 50/125 multimode OM3 - 50/125 multimode OM4 - 50/125 multimode	NA	33m (104.98 ft.) 82m (269 ft.) 300m (984.25 ft.) 550 m (1804 ft.)
Ethernet 10 Gbps LR (long reach) SFP+, 10 km, 1310 nm	Single mode media (9/125 microns)	NA	10 km (6.2 mi.)
1m direct-attached SFP+ copper cable	Copper active Twinaxial cable[1]	1m (3.2 ft.)	1m (3.2 ft.)
3m direct-attached SFP+ copper cable	Copper active Twinaxial cable[a]	3m (9.8 ft.)	3m (9.8 ft.)

Table 5-3. GbE transceiver cable specifications

Transceiver	Cable	Minimum Length	Maximum Length
5m direct-attached SFP+ copper cable	Copper active Twinaxial cable[a]	5m (16.4 ft.)	5m (16.4 ft.)

1. Besides Brocade-branded active Twinaxial cables, QLogic BR-Series Adapters allow active cables from other vendors (based on supported switches), although non-Brocade cables have not been tested and are not supported.

Table 5-4 summarizes maximum distances supported on fiber optic cable types for Fibre Channel transceivers. This table assumes a 1.5 dB connection loss and an 850 nm laser source.

Table 5-4. Fibre Channel transceiver cable specifications

Transceiver type	Speed	OM1 (M6) 62.5/125 micron	OM2 (M5) 50/125 micron	OM3 (M5E) 50/125 micron	OM4 (M5F) 50/125 micron	Single Mode Media (9 microns)
SWL	2 Gbps	150m (492ft)	300m (984ft)	500m (1640ft)	N/A	N/A
SWL	4 Gbps	70m (229ft)	150m (492ft)	380m (1,264ft)	400m (1,312ft)	N/A
SWL	8Gbps	21m (68ft)	50m (164ft)	150m (492ft)	190m (623ft)	N/A
SWL	16Gbps	15m (49ft)	35m (115ft)	100m (328ft)	125m (410ft)	NA
LWL	2Gbps	N/A	N/A	N/A	N/A	10km (6.2mi)
LWL	4Gbps	N/A	N/A	N/A	N/A	10km (6.2mi)
LWL	8Gbps	N/A	N/A	N/A	N/A	10km (6.2mi.)
LWL	16Gbps	N/A	N/A	N/A	N/A	10km (6.2 mi)

Cables are not shipped with the stand-up Fabric Adapter.

For stand-up adapters, use only Brocade-branded SFP laser transceivers supplied with the adapters.

Adapter LED operation (stand-up adapters)

Figure 5-1 illustrates LED indicator locations on a QLogic dual-port BR-1860 (A) and a QLogic single-port (B) stand-up Fabric Adapters. LED indicators for each port are visible through the mounting brackets.

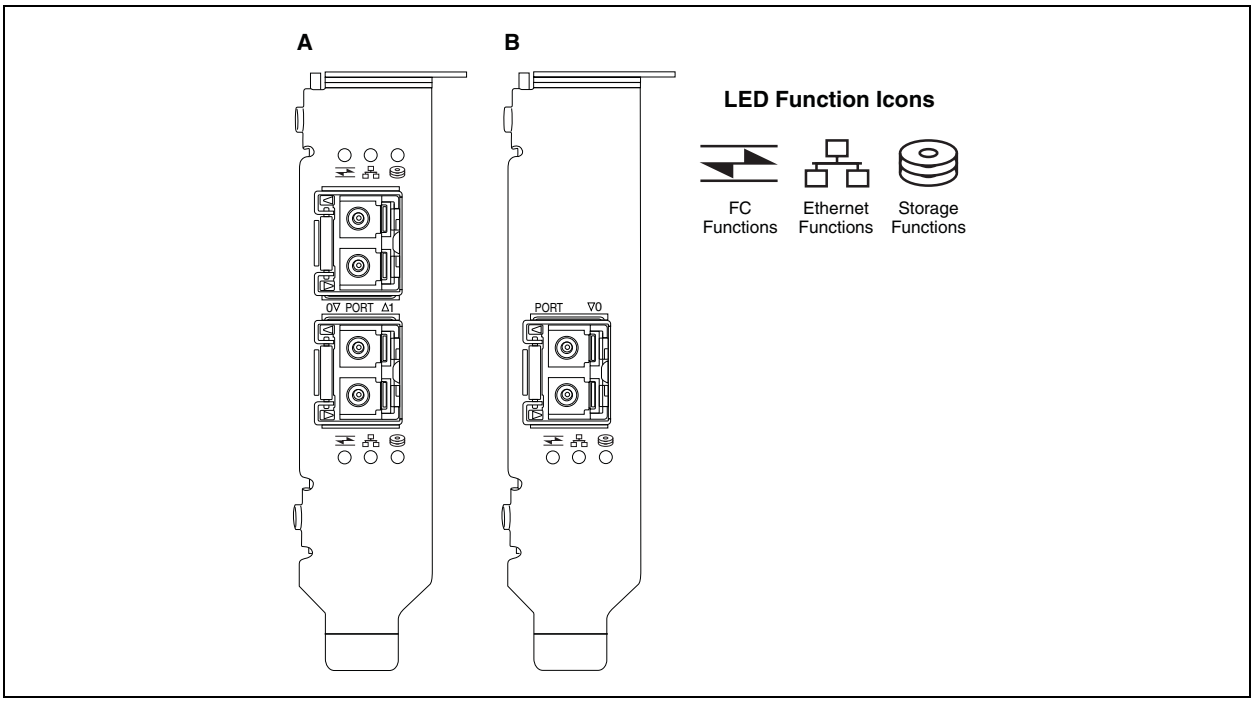


Figure 5-1. LED locations for dual-port (A) and single-port (B) BR-1860 Fabric Adapters

Table 5-5 describes operation for the following LEDs visible on the CNA:

Table 5-5. LED operation

			State
Slow flashing green[1]	Slow flashing green	Slow flashing green	Beaconing
Slow flashing green	Slow flashing green	Off	Invalid optic

Table 5-5. LED operation (Continued)

			State
Slow flashing green	Off	Off	Power on Port in FC mode No Link
On	Off	Off	Power on FC link established No activity
On	Off	Fast flashing green[2]	Power on Link established Receive and Transmit FC activity
Off	Slow flashing green	Off	Power on Port in Ethernet mode No link
Off	On	Off	Power on Ethernet link established No activity
Off	On	Fast flashing green	Power on Link established Receive and Transmit FCoE activity
Off	Fast flashing green	Off	Power on Link established Receive and Transmit Ethernet activity only
Off	Fast flashing green	Fast flashing green	Power on Link established Receive and Transmit Ethernet and FCoE activity

1. 1 second on / 1 second off
2. 50 msec on / 50 msec off

Environmental and power requirements

This section provides environmental and power specifications for BR-1860 standup Fabric Adapters.

These are low-profile MD2 form factor PCI Express (PCIe) cards, measuring 16.751 cm by 6.878 cm (6.595 in. by 2.708 in.), that install in PCIe connectors in standard host systems.

Table 5-11 lists environmental and power specifications for the stand-up type Fabric Adapters.

Table 5-6. Environmental and power requirements

Property	Requirement
Airflow	45 LFM
Operating altitude	3,048 meters (10,000 ft.) at 40°C (104°F)
Nonoperating altitude	12,192 meters (40,000 ft.) at 25°C (77°F)
Operating temperature	0°C to 55°C (32°F to 131°F) dry bulb
Nonoperating temperature	-42°C to 73°C (-40°F to 163°F)
Operating humidity	5% to 93% (relative-noncondensing)
Nonoperating humidity	5% to 95% (relative-noncondensing)
Power consumption adapter and optics	9 W typical with SFP transceiver running 16 Gbps traffic
Operating voltage	12V

Converged Network Adapters

Two types of CNAs are available:

- Stand-up adapter
- Mezzanine adapter

The QLogic stand-up CNAs are low-profile MD2 form factor PCI Express (PCIe) cards, measuring 6.60 in. by 2.71 in. (16.77 cm by 6.89 cm). CNAs are shipped with different sizes of brackets for mounting adapters in your host system. Table 5-7 lists the two bracket types and dimensions.

Table 5-7. CNA mounting brackets

Bracket Type	Dimensions
Low Profile	1.84 cm by 8.01 cm (.73 in. by 3.15 in.)
Standard	1.84 cm by 12.08 cm (.73 in. by 4.76 in.)

Mezzanine CNAs are smaller than stand-up modules. For example, the BR-1007 adapter is an IBM compact form factor horizontal (CFFh) adapter measuring approximately 12.44 cm by 1.27 cm. by 16 cm (4.9 in. by 0.5 in. by 6.3 in.). Mezzanine adapters mount on blade servers that install in supported blade system enclosures. Refer to the “Server blades and system enclosures (mezzanine adapters)” on page 16 for references to CNA compatibility information. Note that mezzanine CNAs do not have external port connectors with optics such as stand-up CNAs, but internal ports that connect to switch and I/O modules installed in the blade system enclosure through high-speed links in the internal enclosure backplane.

PCI Express interface

Install QLogic stand-up CNAs in PCI Express (PCIe) computer systems with an Industry Standard Architecture/Extended Industry Standard Architecture (ISA/EISA) bracket type. Install the QLogic mezzanine CNAs in supported server blades in supported blade system enclosures. On-board flash memory provides BIOS support over the PCIe bus.

The CNA is designed to operate on an x8 lane DMA bus master at 250 GMhz. Operation can negotiate from x8 to x4, x2, and x1 lanes. Following are transfer and data rate specifications for operation in PCIe Gen 2 and Gen 1 connectors:

- PCIe Gen 2 connector. Transfer rate of 5 Gigatransfers per second per lane. Data rate of 500 MBps per lane.
- PCIe Gen 1 connector. Transfer rate of 2.5 Gigatransfers per second per lane. Data rate of 250 MBps per lane.

PCI system values

All QLogic BR-Series FCoE CNAs share a common PCI Vendor ID (VID) value to allow drivers and BIOS to recognize them as supported Fibre Channel and network devices. CNAs are also assigned PCI subsystem vendor IDs (SVIDs) and subsystem IDs (SSIDs) to allow drivers and BIOS to distinguish between individual host adapter variants. You can locate PCI device, vendor, and subsystem IDs for the installed FCoE CNAs through your host's operating system tools. For example, if using Windows, use the following steps.

1. Access the Device Manager

   The CNA appears as a Fibre Channel adapter and as an Ethernet controller or adapter.

2. Open the **Properties** dialog box for the CNA by right-clicking the CNA and selecting **Properties** from the shortcut menu.

3. Select the **Details** and **Driver** tabs to locate specific values.

Hardware specifications

The CNA supports features outlined in Table 5-8.

Table 5-8. CNA hardware specifications

Feature	Description
Port speeds	10.312 Gbps
SFP transceivers (stand-up adapters)	■ Multimode fiber optic small form factor pluggable plus (SFP+) transceiver ■ Copper SFP+ transceiver
Connectivity	■ Stand-up adapters - LC cable connectors ■ Mezzanine adapters - Interfaces to enclosure midplane for connection to switch, I/O, and other modules are built on the card surface.
ASIC	■ Provides the FCoE functionality for the CNA. ■ Two on-board processors, each operating at 400 MHz, which coordinate and process data in both directions.
External serial FLASH memory	■ Stores firmware and CNA BIOS code ■ 4 MB capacity
Data transfer rate	10.312 Gbps full-duplex

Table 5-8. CNA hardware specifications (Continued)

Feature	Description
Performance per port	500,000 IOPs (maximum) 1 M IOPS per dual-port adapter
Topology	10 Gbps DCB
Supported Ethernet protocols and features	■ 803.3ae (10 Gbps Ethernet) ■ 802.1q (VLAN) ■ 802.1q (tagging) ■ 802.1P (tagging) ■ 802.1Qaz (enhanced transmission selection) ■ 802.1Qbb (priority flow control) ■ 802.1AB (Link Layer Discovery Protocol) ■ 802.3ad (link aggregation) ■ 802.1p (priority encoding) ■ 802.3x (Ethernet flow control) ■ 802.3ap - KX/KX4 (auto negotiation) ■ 802.3ak - CX4 ■ PXE (Preboot Execution Environment) ■ UNDI (Universal Network Device Interface) ■ NDIS (Network Data Interface Specification) 6.2 ■ EEE 1149.1 (JTAG) for manufacturing debug and diagnostics. ■ IP/TCP/UDP Checksum Offload ■ IPv4 Specification (RFC 791) ■ IPv6 Specification (RFC 2460) ■ TCP/UDP Specification (RFC 793/768) ■ ARP Specification (RFC 826) ■ Data Center Bridging (DCB) Capability ■ DCB Exchange Protocol (DCBXP) 1.0 and 1.1 ■ Dell iSCSI

Table 5-8. CNA hardware specifications (Continued)

Feature	Description
Supported Ethernet protocols and features (continued)	■ Flexible MAC addressing ■ RSS with support for IPV4TCP, IPV4, IPV6TCP, IPV6 hash types ■ Syslog ■ Jumbo frames ■ Interrupt coalescing ■ Interrupt moderation ■ Multiple transmit queues for Windows and Linux ■ Multiple transmit priority queues ■ Network Priority ■ Large and small receive buffers ■ SNMP (Windows and Linux) ■ TCP Large Segment Offload ■ Team VM queues ■ NetQueues with multiple priority levels for VMware ■ Unicast MAC address ■ MAC filtering ■ Multicast MAC addresses ■ VLAN Discovery using proprietary logic ■ VLAN discovery for untagged/priority-tagged FIP frames ■ VLAN filtering ■ VMware NetQueues v3 (VMware 4.1 and above)

Table 5-8. CNA hardware specifications (Continued)

Feature	Description
Supported FCoE protocols and features	■ VMware NetIOC ■ Look-ahead data split ■ LKA (Link Keep Alive) protocol ■ preFIP, FIP 1.03, and FIP 2.0 (FC-BB5 rev. 2 compliant) ❑ FIP discovery protocol for dynamic FCF discovery and FCoE link management. ❑ FPMA and SPMA type FIP fabric login. ■ FCoE protocols ❑ FCP-3 -(initiator mode only) ❑ FC-SP ❑ FC-LS ❑ FC-GS ❑ FC-FS2 ❑ FC-FDMI ❑ FC-CT ❑ FCP ❑ FCP-2 ❑ FCP-3 ❑ FC-BB-5 ■ FCoE checksum offload ■ SCSI SBC-3 ■ NPIV ■ IP-over-FC (IPoFC) ■ Target rate limiting ■ Boot Over SAN ■ Fabric-Based Boot LUN Discovery ■ Persistent binding ■ I/O interrupt coalescing and moderation ■ Class 3, Class 2 control frames ■ vHBA

Table 5-8. CNA hardware specifications (Continued)

Feature	Description
Other features	■ ASIC Flip-flops Parity Protected ■ T10 Data CRC ■ ECC Memory Parity Protected

NOTE

For stand-up adapters, use only Brocade-branded SFP laser transceivers supplied with the adapters.

Cabling (stand-up adapters)

Table 5-9 lists the supported cabling for adapter transceiver types.

Table 5-9. Transceiver and cable specifications

Transceiver	Cable	Minimum Length	Maximum Length
Ethernet 10 Gbps SR (short range) SFP+ 1490 nm	OM1 - 6.25/125 multimode OM2 - 50/125 multimode OM3 - 50/125 multimode OM4 - 50/125 multimode	NA	33m (104.98 ft.) 82m (269 ft.) 300m (984.25 ft.) 550 m (1804 ft.)
Ethernet 10 Gbps LR (long reach) SFP+, 10 km, 1310 nm	Single mode media (9 microns)	NA	10 km (6.2 mi.)
1m direct-attached SFP+ copper cable	Copper active Twinaxial cable[1]	1m (3.2 ft.)	1m (3.2 ft.)
3m SFP+ direct-attached copper cable	Copper active Twinaxial cable[1]	3m (9.8 ft.)	3m (9.8 ft.)
5m direct-attached SFP+ copper cable	Copper active Twinaxial cable[1]	5m (16.4 ft.)	5m (16.4 ft.)

1. Besides Brocade-branded active Twinaxial cables, QLogic BR-Series Adapters allow active cables from other vendors (based on supported switches), although non-Brocade cables have not been tested and are not supported.

NOTE

Cables are not shipped with the stand-up CNA.

Adapter LED operation (stand-up adapters)

Figure 5-2 illustrates LED indicator locations on a BR-1020 stand-up CNA. LED indicators for each port are visible through the mounting brackets.

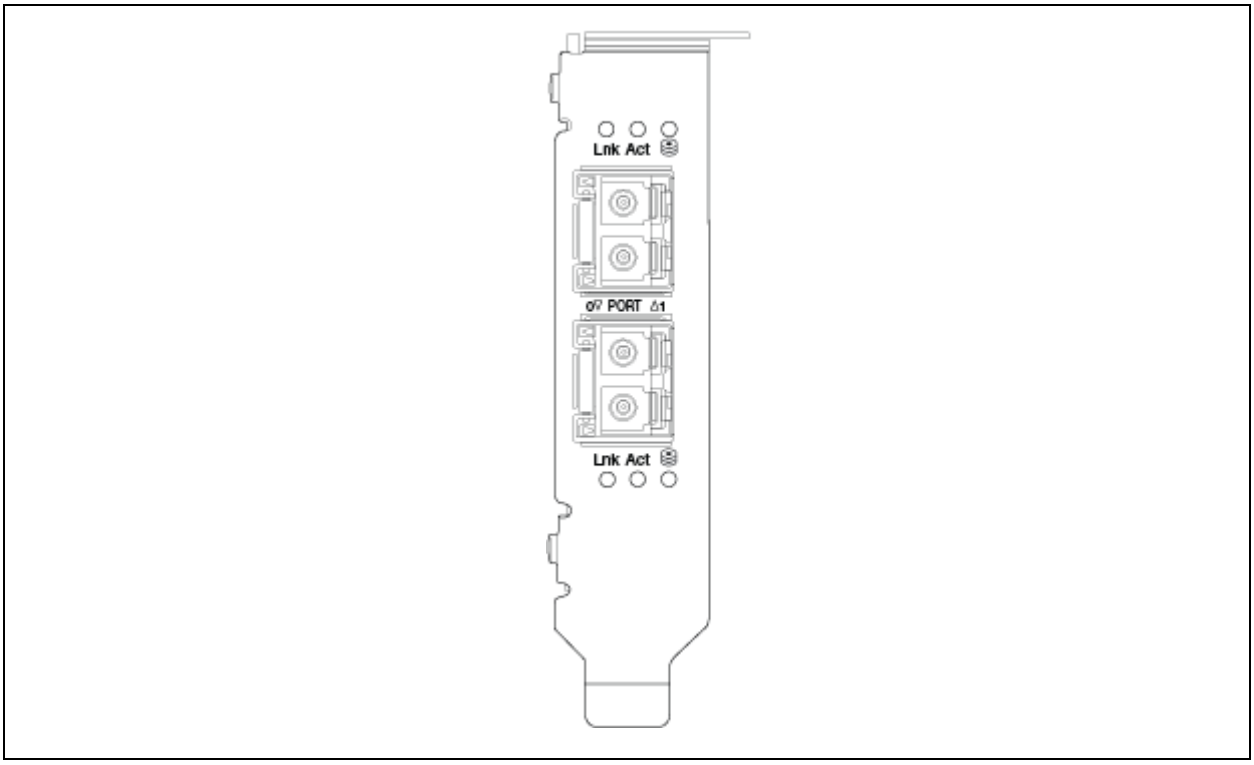


Figure 5-2. LED locations for BR-1020 CNA

Table 5-10 describes operation for the following LEDs visible on the CNA:

- Lnk - Link state (up or down).
- Act - Storage or network activity (traffic) is occurring over the Ethernet link.
- Storage (icons) - FCoE activity is occurring over link.

Table 5-10. LED operation

Lnk	Act	Storage	State
Off	Off	Off	Adapter not operational. It may not be powered up or not initialized.
Slow flashing green[1]	Off	Off	Adapter is operational, but the physical link is down.
Steady green	Off	Off	Link is up. No Ethernet or storage traffic.
Steady green	Off	Fast flashing green[2]	Link is up. Storage traffic only.
Steady green	Fast flashing green[2]	Off	Link is up. Ethernet traffic only.
Steady green	Fast flashing green[2]	Fast flashing green[2]	Link is up. Both Ethernet and storage traffic.
Beacon flashing green	Beacon flashing green[3]	Beacon flashing green[3]	Port beaconing function.
Beacon flashing green	Beacon flashing green[4]	Beacon flashing green[4]	End-to-end beaconing function. CNA port and port on connected switch beacon.
Flashing amber[5]	Off	Off	Unsupported SFP transceiver.

1. 1 second on / 1 second off
2. 50 msec on / 50 msec off
3. 1 sec on / 250 msec off
4. 1 sec on / 250 msec off
5. 640 msec on / 640 msec off

Environmental and power requirements

This section provides environmental and power specifications for the stand-up and mezzanine card CNAs.

Stand-up CNAs

Table 5-11 lists environmental and power specifications for the stand-up type CNAs.

Table 5-11. Environmental and power requirements

Property	Requirement
Airflow	45 LFM
Operating altitude	3,048 meters (10,000 ft.) at 40°C (104°F)
Nonoperating altitude	12,192 meters (40,000 ft.) at 25°C (77°F)
Operating temperature	-5°C to 50°C (23°F to 122°F) dry bulb
Nonoperating temperature	-43°C to 73°C (-40°F to 163°F)
Operating humidity	10% to 93% (relative-noncondensing)
Nonoperating humidity	5% to 95% (relative-noncondensing)
Power consumption CNA and optics	12 W maximum
Operating voltage	Per PCIe 2.0 specifications

Mezzanine CNAs

This section provides specifications for mezzanine CNAs.

BR-1007 CNA

Table 5-12 lists environmental and power specifications for the BR-1007 CNA.

Table 5-12. Environmental and power requirements for BR-1007 CNA mezzanine card

Property	Requirement
Airflow	Provided by blade system enclosure.
Operating altitude	3,048 meters (10,000 ft.)
Nonoperating altitude	12,193 meters (40,000 ft.)
Operating temperature	0 to 50 °C (32 to 122 °F)
Nonoperating temperature	-40 °C to 73 °C to (-40 °F to 163 °F)
Operating humidity	50 °C (122 °F) at 10% to 93%
Nonoperating humidity	60 °C (140 °F) at 10% to 93%
Power dissipation	9.5 W maximum 8.5 W nominal
Operating voltage	Per PCIe 2.0 specifications
Dimensions	Approximate height: 13 mm (0.5 in) Approximate width: 160 mm (6.3 in) Approximate depth: 124 mm (4.9 in) Approximate weight: 127 g (0.28 lb)

The BR-1007 adapter conforms to environmental and power specifications for the supported blade servers and blade system enclosures in which they install. Refer to the documentation provided for these products for information. Also refer to “Server blades and system enclosures (mezzanine adapters)” on page 16.for references to CNA compatibility information.

BR-1741 CNA

Table 5-13 lists environmental and power specifications for the BR-1741 CNA.

Table 5-13. Environmental and power requirements for BR-1741 CNA mezzanine card

Property	Requirement
Airflow	Provided by blade system enclosure.
Operating altitude	3,048 meters (10,000 ft.)
Nonoperating altitude	10,600 meters (35,000 ft.)
Operating temperature	0 to 35°C (32 to 95°F)
Nonoperating temperature	-40 °C to 65°C (-40 °F to 149 °F)
Operating humidity	35 °C (95 °F) at 20% to 80%
Nonoperating humidity	65 °C (149 °F) at 5% to 95%
Power consumption	15 W required 12 W measured
Operating voltage	Per PCIe 2.0 specifications
Dimensions	9.144 cm by 3.81 cm by 8.382 cm (3.6 in. by 1.5 in. by 3.3 in.)

The BR-1741 mezzanine adapter conforms to environmental and power specifications for the supported server blades and blade system enclosures in which they install. Refer to the documentation provided for these products for more information. Also refer to “Server blades and system enclosures (mezzanine adapters)” on page 16.for references to CNA compatibility information.

Host Bus Adapters

Two types of HBAs are available:

- Stand-up
- Mezzanine

The stand-up HBAs are low-profile MD2 form factor PCI Express (PCIe) cards, measuring 16.76 cm by 6.89 cm (6.6 in. by 2.71 in.) that install in standard host computer systems. HBAs are shipped with a low-profile bracket installed and a standard bracket included for mounting in your host system). These HBAs contain either one or two external ports for connecting to Fibre Channel switches via fiber optic cable. Table 5-14 provides the dimensions for the two bracket types.

Table 5-14. Mounting brackets for stand-up HBAs

Bracket Type	Dimensions
Low Profile	1.84 cm by 8.01 cm (.73 in. by 3.15 in.)
Standard	1.84 cm by 12.08 cm (.73 in. by 4.76 in.)

The mezzanine type HBAs are smaller cards. For example, the BR-804 adapter measures approximately 10.16 cm by 11.43 cm (4 in. by 4.5 in.). Mezzanine adapters mount on server blades or compute nodes that install in supported blade system enclosures or chassis. Refer to “Hardware compatibility” on page 25 for references to HBA compatibility information. Note that mezzanine adapters do not have external port connectors with optics such as stand-up HBAs, but internal ports that connect to the switch and interconnect modules installed in the enclosure or chassis through high-speed links in the internal enclosure backplane.

PCI Express interface

Install QLogic BR-Series stand-up HBAs in PCI Express computer systems with an Industry Standard Architecture/Extended Industry Standard Architecture (ISA/EISA) bracket type.

Install QLogic BR-Series mezzanine HBAs in supported blade servers that install in supported blade system enclosures or chassis. Multiple HBAs may be mounted in connectors located at different locations in the blade server.

Following are some of the features of the PCIe interface:

- Supports PCI Express specifications Gen2 (PCI Base Specification 2.0) and Gen1 (PCI Base Specification 1.0, 1.1a, and 1.1).
- Operates as an x8 lane DMA bus master at 2.5 GHz, full duplex.

- Effective data rate on Gen2 systems is 32 Gbps and on Gen1 systems is 16 Gbps.
- On-board flash memory provides BIOS support over the PCI bus.

PCI system values

All QLogic BR-Series HBAs share a common PCI Vendor ID (VID) value to allow drivers and BIOS to recognize them as supported Fibre Channel products. HBAs are also assigned PCI subsystem vendor IDs (SVIDs) and subsystem IDs (SSIDs) to allow drivers and BIOS to distinguish between individual host adapter variants. You can locate PCI device, vendor, and subsystem IDs for the installed Fibre Channel HBA through your host's operating system tools. For example, if using Windows, use the following steps.

1. Access the Device Manager
2. Open the **Properties** dialog box for the HBA by right-clicking the HBA and selecting **Properties** from the shortcut menu.
3. Select the **Details** and **Driver** tabs to locate specific values.

Hardware specifications

The Fibre Channel interface supports features outlined in Table 5-15.

Table 5-15. Supported Fibre Channel features

Feature	Description
Port Speeds	BR-804: ■ Internal ports allow user-selectable or auto-negotiated speeds of 8, 4, 2, or 1 Gbps per port. BR-1867 and BR-1869: ■ Internal ports allow 16 or 8 Gbps per port. BR-825 and BR-815: ■ An installed 8 Gbps SFP+ transceiver allows user-selectable or auto-negotiated speeds of 8, 4, or 2 Gbps per port. ■ An installed 4 Gbps SFP transceiver allows user-selectable or auto-negotiated speeds of 4, 2, or 1 Gbps per port. **NOTE** 8 Gbps adapters support 1 Gbps at the driver level, but not in a BIOS or boot over SAN configuration.
SFP transceivers (stand-up adapters)	Multimode small form factor pluggable (SFP) transceiver

Table 5-15. Supported Fibre Channel features (Continued)

Feature	Description
Cable connector	■ Stand-up adapters - LC connectors. ■ Mezzanine adapters - Interfaces with enclosure midplane for connection to switch, I/O, and other modules are built on the card surface.
ASIC	■ Provides the Fibre Channel functionality for all HBA models. ■ Two on-board processors, each operating at 400 MHz, generate signal timing and link protocol in compliance with Fibre Channel standards.
External serial FLASH memory	■ Stores firmware and HBA BIOS code ■ 4 MB capacity
Data rate Per Port - Full duplex	BR-1867 and BR-1869 ■ 1600 MB/sec at 16Gbps ■ 800 MB/sec at 8Gbps
Performance per port	500,000 IOPs (maximum)
Distance support (stand-up adapters)	50 m at 8 Gbps with 62.5/125 micron multimode fiber
Topology	Fibre Channel - Point-to-Point (N_Port) Fibre Channel - Switched Fabric (N_Port) Fibre Channel Arbitrated Loop (FC-AL) -standup adapters only
Protocols	■ SCSI over FC (FCP) ■ FCP3 - initiator mode only ■ FC-SP Authentication ■ NPIV

Table 5-15. Supported Fibre Channel features (Continued)

Feature	Description
Other features	■ ASIC Flip-flops Parity Protected ■ ECC Memory Parity Protected ■ Quality of Service (QoS) ■ Target rate limiting ■ Boot over SAN ■ Fabric-Based Boot LUN Discovery ■ I/O Interrupt Coalescing ■ T10 Data CRC ■ Multiple Priority (VC_RDY) ■ Frame-Level Load Balancing ■ Persistent Binding ■ Fabric-Based Configuration

NOTE

For stand-up HBAs, use only Brocade-branded SFP laser transceivers supplied with this product.

Cabling (stand-up adapters)

Table 5-16 summarizes maximum distances supported for different fiber optic cable types. This table assumes a 1.5 dB connection loss and an 850 nm laser source.

Table 5-16. Fibre Channel transceiver and cable specifications

Transceiver type	Speed	OM1 (M6) 62.5/125 micron	OM2 (M5) 50/125 micron	OM3 (M5E) 50/125 micron	OM4 (M5F) 50/125 micron	Single Mode Media (9 microns)
SWL	2Gbps	150m (492ft)	300m (984ft)	500m (1640ft)	N/A	N/A
SWL	4Gbps	70m (229ft)	150m (492ft)	380m (1,264ft)	400m (1,312ft)	N/A
SWL	8Gbps	21m (68ft)	50m (164ft)	150m (492ft)	190m (623ft)	N/A
LWL	2Gbps	N/A	N/A	N/A	N/A	10km (6.2mi)
LWL	4Gbps	N/A	N/A	N/A	N/A	10 km (6.2mi)
LWL	8Gbps	N/A	N/A	N/A	N/A	10km (6.2mi)

Adapter LED operation (stand-up adapters)

Figure 5-3 illustrates LED indicator locations on a BR-825 and a BR-815. LED indicators for each port are visible through the mounting brackets. Since the BR-825 operates at speeds up to 8 Gbps, each port has a 1|2, 4, and 8 Gbps LED.

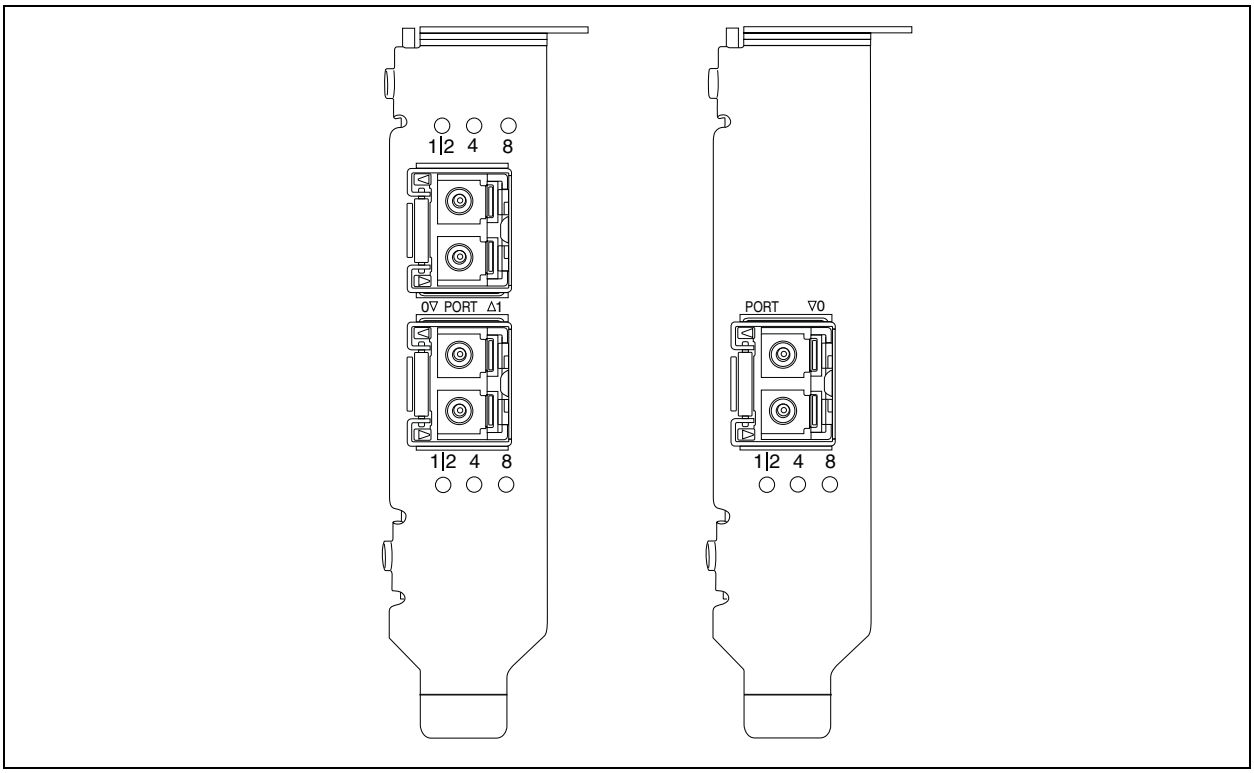


Figure 5-3. LED locations for BR-825 HBA (A) and BR-815 (B)

Table 5-17 provides the meanings for LED operation on a specific port.

Table 5-17. LED operation

LED Operation	Meaning
LED is steady green	Depending on the LED illuminated, link is active at 1-2, 4, or 8 Gbps. Port is online (connected to an external device) but has no traffic. Note that only one of these LEDs will be steady green to indicate speed.
LED flickering green	Activity, such as data transfers, is occurring on the active link.
All LEDs flashing green 1 sec on - 250 msec off	Beaconing is enabled on the port.
All LEDs flashing green 50 msec on 50 msec off 350 msec off	End-to-end beaconing is enabled for connected switch and HBA port.
4 Gbps LED flashes amber	Unsupported SFP transceiver. Appropriate Brocade-branded SFP transceiver is not installed.

Environmental and power requirements

This section provides environmental and power specifications for the stand-up and mezzanine HBAs.

Stand-up HBAs

Table 5-18 provides environmental and power specifications for the stand-up HBAs.

Table 5-18. Environmental and power requirements

Property	Requirement
Airflow	None required.
Operating temperature (dry bulb)	0°C to 55°C (32°F to 131°F)
Nonoperating temperature (dry bulb)	-43°C to 73°C (-40°F to 163°F)
Operating humidity	5% to 93% (relative-noncondensing)
Nonoperating humidity	5% to 95% (relative-noncondensing)
Power dissipation	6.3W Maximum not including SFP transceiver.
Operating voltage	Per PCIe 2.0 specifications

Mezzanine HBAs

This section includes specifications for the mezzanine HBA models.

BR-804 Adapter

The BR-804 mezzanine adapter conforms to environmental and power specifications for the supported blade servers and blade system enclosures in which they install. Refer to the documentation provided for these products for information. Also refer to “Server blades and system enclosures (mezzanine adapters)” on page 16.

BR-1867 Adapter

Table 5-19 lists environmental, power, and other specifications for the BR-1867 HBA.

Table 5-19. Environmental and power requirements for BR-1867 mezzanine card

Property	Requirement
Airflow	Provided by blade system enclosure.
Operating altitude	3,050 meters (10,000 ft.)
Operating temperature	10 to 35°C (50 to 95 °F)
Nonoperating temperature	5° to 45°C (41°F to 113°F)
Operating humidity	20% to 80%
Nonoperating humidity	8% to 80%
Power dissipation	8.5 W maximum 8 W nominal
Operating voltage	Per PCIe 2.0 specifications
Dimensions	Approximate height: 4.16 cm (1.64 in.) Approximate width: 8.48 cm (3.34 in.) Approximate depth: 10.64 cm (4.19 in.)
Weight	240 grams (.31 lb)

The BR-1867 adapter conforms to environmental and power specifications for the supported compute node and chassis where the adapters install. Refer to the documentation provided for these products for information. Also refer to “Server blades and system enclosures (mezzanine adapters)” on page 16.for references to adapter compatibility information.

BR-1869 Adapter

Table Table 5-20 lists environmental, power, and other specifications for the BR-1869 Adapter.

Table 5-20. Environmental and power requirements for BR-1869 mezzanine card

Property	Requirement
Operating environment	Provided by blade system enclosure.
Nonoperating altitude	12,192 meters (40,000 ft.)
Nonoperating temperature	-40°C (-40°F) maximum
Power dissipation	17 W maximum 16 W nominal
Operating voltage	Per PCIe 2.0 specifications
Dimensions	Approximate height: 36.4 mm (1.43 in.) Approximate width: 107.8 mm (4.24 in.) Approximate depth: 157.9 mm (6.22 in.)
Weight	230 grams (.51 lb)

The BR-1869 adapter conforms to environmental and power specifications for the supported compute node and chassis where the adapters install. Refer to the documentation provided for these products for information. Also refer to “Server blades and system enclosures (mezzanine adapters)” on page 16.for references to adapter compatibility information.

Fibre Channel standards compliance

QLogic BR-Series Adapters meet or exceed the Fibre Channel standards for compliance, performance, and feature capabilities.

Regulatory compliance

This section provides international regulatory compliance notices for the QLogic BR-Series Adapters.

Stand-up adapters

The regulatory statements in this section pertain to the following stand-up adapters:

- BR-815 HBA
- BR-825 HBA
- BR-1020 CNA
- BR-1860 Fabric Adapter

FCC warning (US only)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by “QLogic” for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or locate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Communications Commission (KCC) statement

This is the Republic of Korea Communications Commission (KCC) regulatory compliance statement for Class B products.

Class B device (Broadcasting Communication Device for Home Use): This device obtained EMC registration mainly for home use (Class B) and may be used in all areas.

B급 기기 (가정용 방송통신기기): 이 기기는 가정용(B급)으로 전자파적합등록을 한 기기로서 주로 가
에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

VCCI statement (Japan)

This is Class B product based on the standard of the Voluntary Control Council For Interference by Information Technology Equipment (VCCI).

If this equipment is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準
に基づくクラスＢ情報技術装置です。この装置は、家庭環境で使用すること
を目的としていますが、この装置がラジオやテレビジョン受信機に近接して
使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

BSMI warning (Republic of Taiwan)

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻

干擾，在這種情況下，使用者會被要求採取某些適當的對策。

CE statement

NOTE

This is a Class B product. In a domestic environment, this product might cause radio interference, and the user might be required to take corrective measures.

The standards compliance label on the adapter contains the CE mark which indicates that this system conforms to the provisions of the following European Council directives, laws, and standards:

- Electromagnetic Compatibility (EMC) Directive 89/336/EEC and the Complementary Directives 92/31/EEC, 93/68/EEC, and (2004/108/EEC).
- Low Voltage Directive (LVD) 73/23/EEC and the Complementary Directive 93/68/EEC
- EN50082-2/EN55024:1998 (European Immunity Requirements)
  - EN61000-3-2/JEIDA (European and Japanese Harmonics Spec)
  - EN61000-3-3

Canadian requirements

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Laser compliance

This equipment contains Class 1 laser products and complies with FDA Radiation Performance Standards, 21 CFR Subchapter I and the international laser safety standard IEC 825-2.

CAUTION

Use only optical transceivers that are qualified by QLogic Corporation and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 825-2. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

Safety and EMC regulatory compliance

Table 5-21 lists the regulatory compliance standards and certifications for which the adapter is certified.

Table 5-21. Regulatory certifications and standards

Country	Safety specification	EMC specification
Australia and New Zealand		EN55022 or CISPR22 or AS/NZS CISPR22 C-Tick Mark
Canada	Bi-Nat UL/CSA 60950-1 2nd Ed or latest. cCSAus	ICES-003 Class B
European Union (Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, The Netherlands, and United Kingdom)	EN 60950-1 or latest TUV	CE EN55022:2006 Class B EN 55024 (Immunity) EN 61000-4-2 Electrostatic Discharge EN 61000-4-3 Radiated Fields EN 61000-4-4 Electrical Fast Transients EN 61000-4-5 Surge Voltage EN 61000-4-8 Magnetic Fields (N/A) EN 61000-4-11 Voltage Dips and Interruptions EN 61000-3-2 Limits for Harmonic Current Emissions EN 61000-3-3 Voltage Fluctuations
Japan		CISPR22 and JEIDA (Harmonics) VCCI-B and Statement
Republic of Korea		KN24 KN22 KCC Mark Class B
Russia	IEC60950-1 or latest GOST Mark	51318.22-99 (Class B) and 51318.24-99 or latest GOST Mark

Table 5-21. Regulatory certifications and standards (Continued)

Country	Safety specification	EMC specification
Taiwan	CNS14336(94) Class B or latest BSMI Mark	CNS13438(95) Class B or latest BSMI Mark
United States	Bi-Nat UL/CSA 60950-1 2nd Ed or latest. cCSAus	ANSI C63.4 FCC Class B and Statement

Environmental and safety compliance

This section provides international environmental and safety compliance notices for QLogic BR-Series Adapters.

Environmental Protection Use Period (EPUP) Disclaimer

In no event do the EPUP logos shown on the product and FRUs alter or expand that warranty that QLogic provides with respect to its products as set forth in the applicable contract between QLogic and its customer. QLogic hereby disclaims all other warranties and representations with respect to the information contained on this CD including the implied warranties of merchantability, fitness for a particular purposes and non-infringement.

The EPUP assumes that the product will be used under normal conditions in accordance with the operating manual of the product.

环保使用期限 **(EPUP)** 免责声明：
EPUP 标志不会出现在产品和 FRU 的改装产品中，也不会对 Brocade 所提供的相关产品保修条款（该保修条款在 Brocade 及其客户间达成的适用合同中列出）进行增补。对于此 CD 上包含的相关信息，如适销性、针对特定用途的适用性和非侵权性的暗示保证，Brocade 在此郑重声明本公司对于与上述信息相关的所有其他保证和陈述概不负责。
EPUP 假设在“产品操作手册”中注明的常规条件下使用该产品。

China RoHS

The contents included in this section are per the requirements of the People's Republic of China- Management Methods for Controlling Pollution by Electronic Information products.

遵守环境法规
中国 **RoHS**
本节中包含的内容都遵守了中华人民共和国《电子信息产品污染控制管理办法》的要求。

Names and Contents of the Toxic and Hazardous Substances or Elements

In accordance with China's Management Measures on the Control of Pollution caused by Electronic Information products (Decree No. 39 by the Ministry of Information Industry), the information in Table 5-22 is provided regarding the names and concentration level of Hazardous substances (HS) which may be contained in this product.

Table 5-22. Hazardous Substances/Toxic Substances (HS/TS) concentration chart

Name of the Component	Hazardous/Toxic Substance/Elements					
	Lead (PB)	Mercury (Hg)	Cadmium (CD)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Fiber Channel Switch	X	O	O	O	O	O
Fan , Blower assemblies	X	O	O	O	O	O
PCBA cards	X	O	O	O	O	O
Host Bus Adapter (HBA)	X	O	O	O	O	O
USB Flash Drive	O	O	O	O	O	O
Power Supply kit	X	O	O	O	O	O
SFPs (optical cable connectors)	X	O	O	O	O	O
Sheet Metal	X	O	O	O	O	O
Chassis Assembly	X	O	O	O	O	O
Mechanical brackets & Slides	X	O	O	O	O	O
Slot Filler	X	O	O	O	O	O
Cable management tray	X	O	O	O	O	O
Cable Comb	O	O	O	O	O	O
Cables and power cords	O	O	O	O	O	O
Replacement Doors	X	O	O	O	O	O
Software / Documentation CDs	O	O	O	O	O	O

X indicates that the concentration of such hazardous/toxic substance in all the units of homogeneous material of such component is higher than the SJ/T11363-2006 Requirements for Concentration Limits.

O indicates that no such substances are used or that the concentration is within the aforementioned limits.

CHINA ROHS **有害物质/有毒物质**(HS/TS)**限量列表**

有毒与有害物质或元素的名称及含量

根据中国的<<电子信息产品污染控制管理办法>> (信息产业部第 39 号令)，本公司提供以下有关产品中可能含有的有害物质(HS)的名称及含量水平的信息。

主要部件名称	有害/有毒物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
光纤通道交换机	X	O	O	O	O	O
风扇/冷却组装件	X	O	O	O	O	O
线路板部件	X	O	O	O	O	O
主机总线适配器 (HBA)	X	O	O	O	O	O
USB 闪存器	O	O	O	O	O	O
电源	X	O	O	O	O	O
SFP（光纤接头）	X	O	O	O	O	O
钣金件	X	O	O	O	O	O
机箱部件	X	O	O	O	O	O
机械支架及滑轨	X	O	O	O	O	O
插槽填充物	X	O	O	O	O	O
电缆整理盘	X	O	O	O	O	O
梳状线缆	O	O	O	O	O	O
线束及电源线	O	O	O	O	O	O
替换门	X	O	O	O	O	O
软件/文档光盘	O	O	O	O	O	O

X　　表示此类部件内同质材料中的有害/有毒含量高于 SJ/T 11363-2006 的限量要求。

O　　表示未使用此类物质或其含量低于上述限量要求。

Safety

Because these boards are installed in a PCIe bus slot, all voltages are below the SELV 42.4 V limit.The adapters are recognized per Bi-Nat UL/CSA 60950-1 1st Ed. or later for use in the US and Canada. They also comply with IEC 60950-1 and EN60950-1. A CB Scheme certificate is available upon request

Mezzanine adapters

The regulatory information in this section pertains to the following mezzanine adapters.

- BR-804 HBA
- BR-1867 HBA
- BR-1007 CNA
- BR-1741 CNA

BR-804 HBA

For the BR-804 HBA, refer to the regulatory compliance information in the Mezzanine Card Installation Instructions that ship with your adapter and to information in your blade system enclosure documentation.

BR-1867 HBA

For the BR-1867 HBA, refer to the regulatory compliance information in the IBM User Guide for your adapter.

BR-1007 CNA

For the BR-1007 CNA, refer to the regulatory compliance information in the Installation and User's Guide that ships with your adapter.

BR-1741 CNA

This section provides regulatory compliance information for the BR-1741 mezzanine card. Also refer to regulatory information provided by Dell for the blade server and Dell™ PowerEdge M1000e modular blade system.

FCC warning (US only)

This equipment has been tested and complies with the limits for a Class A computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.Korea

Communications Commission (KCC) statement

This is the Republic of Korea Communications Commission (KCC) regulatory compliance statement for Class A products.

Class A device (Broadcasting Communication Device for Office Use): This device obtained EMC registration for office use (Class A), and may be used in places other than home. Sellers and/or users need to take note of this.

A급 기기 (업무용 방송통신기기): 이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

VCCI statement (Japan)

This is Class A product is based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance might arise. When such trouble occurs, the user might be required to take corrective actions.

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるように要求されることがあります。

CE statement

NOTE

This is a Class A product. In a domestic environment, this product might cause radio interference, and the user might be required to take corrective measures.

The standards compliance label on the adapter contains the CE mark which indicates that this system conforms to the provisions of European Council directives, laws, and standards listed in Table 5-23.

Canadian requirements

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Safety and EMC regulatory compliance

Table 5-23 lists the regulatory compliance standards and certifications for which the adapter is certified.

Table 5-23. Regulatory certifications and standards

Country	Safety specification	EMC specification
Australia and New Zealand		EN55022 or CISPR22 or AS/NZS CISPR22 C-Tick Mark
Canada	CSA 60950-1-07 2nd Edition cCSAus	ICES-003 Class A
European Union (Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, The Netherlands, and United Kingdom)	EN60950-1:2006+A11 TUV	CE EN55022:2006 Class A (Emissions) EN55024 (Immunity) EN61000-3-2, 2000 (A14) (Harmonics) EN61000-3-3, +A1:2001 (Voltage Fluctuations) EN55022 (Emissions) EN55024 (Immunity)
International		IEC 61000-4-2 (Electrostatic Discharge) IEC 61000-4-3 (Radiated Fields) IEC 61000-4-4 (Electrical Fast Transients) IEC 61000-4-5 (Surge Voltage) IEC 61000-4-6 (Immunity) IEC 61000-4-8 (Magnetic Fields) IEC 61000-4-11 (Voltage Dips and Interruptions)

Table 5-23. Regulatory certifications and standards (Continued)

Country	Safety specification	EMC specification
Japan		CISPR22 VCCI V-3 /2009.04 VCCI V-4 2009.04 VCCI-A and Statement
Republic of Korea		KN24 KN22 KCC Mark Class A
United States	UL 60950-1 2nd Edition cCSAus	ANSI C63.4 FCC Class A and Statement

6 Adapter Support

Providing details for support

Contact your QLogic adapter support provider for hardware, firmware, and software support, including product repairs and part ordering. Provide the following information:

1. General information:
   - QLogic adapter model number.
   - Host operating system version.
   - Software name and software version, if applicable.
   - Support Save output.

     To expedite your support call, use the Support Save feature to collect debug information from the driver, internal libraries, and firmware. You can save valuable information to your local file system and send it to support personnel for further investigation. For details on using this feature, refer to “Using Support Save” on page 313.
   - Detailed description of the problem, including the switch or fabric behavior immediately following the problem, switch description (model and software version), and specific questions.
   - Description of any troubleshooting steps already performed and the results.
2. Adapter serial number:

   The adapter serial number and corresponding bar code are provided on the serial number label illustrated below. This label is located on the adapter card.

   FT00X0054E9

You can also display the serial number through the following HCM dialog boxes and BCU commands:

- Adapter **Properties** tab in HCM.

  Select an adapter in the device tree, and then click the **Properties** tab in the right pane.

- **BCU adapter --list** command.

  This command lists all QLogic BR-Series Adapters in the system and information such as model and serial numbers.

3. Port World-Wide Name (PWWN).

   Determine the PWWN through the following resources:

   - Label on the adapter card contains the PWWN for each port.
   - BIOS Configuration Utility.

     Select the appropriate adapter port from the initial configuration utility screen, and then select **Adapter Settings** to display the WNN and PWWN for the port. For details, refer to “Configuring BIOS with the BIOS Configuration Utility” on page 246.

   - Port **Properties** tab in HCM.

     Select a port for a specific adapter in the device tree, and then click the **Properties** tab in the right pane.

   - The following BCU commands:

     - **port ---query** *port_id*—Displays port information, including the PWWN for the FCoE port. The *port_id* parameter is the port number.
     - **port ---list**—Lists all the physical ports on the adapter along with their basic attributes, such as the PWWN.

4. Media access control (MAC) addresses. These are applicable to CNAs and Fabric Adapter ports configured in CNA mode only.

   The MAC address can be found in HCM by selecting the adapter in the device tree and clicking the **Properties** tab in the right pane to display the adapter **Properties** panel. Look for the **MAC Address** field.

   Each port has a “burned-in” local port MAC address. This is the source MAC for LLDP communications between the adapter and the switch that supports Data Center Bridging (DCB). To find this MAC address, select a DCB port in the HCM device tree, and then click the **Properties** tab in the right pane to display the port **Properties** panel. Look for the **Local port MAC** field.

The Ethernet MAC address is used for normal Ethernet operations. To find this MAC address using HCM, select an Ethernet port in the HCM device tree, and then click the **Properties** tab in the right pane to display the port **Properties** panel. Look for the **Current MAC address** and **Factory MAC address** fields.

Each enode logging in to the fabric through a local adapter port is assigned a MAC address during FCoE Initialization Protocol (FIP) operations. This MAC is assigned for the current FCoE communication only. To find this MAC address, perform one of the following tasks:

- Select an FCoE port in the HCM device tree, and then click the **Properties** tab in the right pane to display the port **Properties** panel. Look for the **FCoE MAC** field.
- Enter the **port --query** *port_id* BCU command. Look for the **FCoE MAC** field.

NOTE

MAC addresses assigned during FCoE initialization operations cannot be changed using device management applications.

The FCoE Forwarder (FCF) MAC address is the address of the attached switch that supports Data Center Bridging (DCB). Select an FCoE port in the HCM device tree, and then click the **Properties** tab in the right pane to display the port **Properties** panel. Look for the **FCF MAC** field.

You can also determine port MAC addresses using the following BCU commands:

- **port --query** *port_id*—Displays port information, including the MAC addresses. The *port_id* parameter is the port number.
- **port --list**—Lists all the physical ports on the adapter along with the adapter, Ethernet, and FCoE MAC addresses.

NOTE

For details on using HCM and BCU commands, refer to the *QLogic BR Series Adapter Administrator's Guide*.

Using Support Save

The Support Save feature is an important tool for collecting debug information from the driver, internal libraries, and firmware. You can save this information to the local file system and send it to support personnel for further investigation. Use one of the following options to launch this feature:

- In HCM, launch Support Save through the **Tools** menu.
- In Management applications, use the **Technical SupportSave** dialog box.
- For BCU, enter the **bfa_supportsave** command.

NOTE

For VMware ESXi 5.0 and later systems, BCU commands are integrated with the esxcli infrastructure. To initiate Support Save on an ESX system, enter **esxcli brocade supportsave**.

- Through your Internet browser (Internet Explorer 6 or later or Firefox 2.0 or later), you can collect Support Save output if you do not have root access, do not have access to file transfer methods such as File Transfer Protocol (FTP) and Secure Copy (SCP), or do not have access to the Host Connectivity Manager (HCM).
- A Support Save collection can also occur automatically for a heartbeat failure. To occur through HCM, HCM must be running. This feature supported on Linux, Windows and Solaris. It is not supported on ESXi5.x.

Launching Support Save through BCU, HCM, and during a heartbeat failure saves the following information:

- Adapter model and serial number
- Adapter firmware version
- Host model and hardware revision
- All support information
- Adapter configuration data
- All operating system and adapter information needed to diagnose field issues
- Information about all adapters in the system
- Firmware and driver traces
- Syslog message logs
- Windows System Event log .evt file
- HCM GUI-related engineering logs

- Events
- Adapter configuration data
- Operating system environmental information
- Data .xml file
- Vital CPU, memory, network resources
- HCM Agent (logs, configuration)
- Driver logs
- Install logs
- Core files
- Details on the CNA or Fabric Adapter Ethernet interface, including IP address and mask.
- Status and states of all adapter ports, including the Ethernet, FCoE, and DCB ports on CNAs and Fabric Adapters.
- DCB status and statistics for CNAs and Fabric Adapters
- Network driver information, Ethernet statistics, offload parameters, and flow control coalesce parameters for CNAs and Fabric Adapters.
- Ethernet offload and flow control parameters for CNAs and Fabric Adapters.

NOTE

Before collecting data through the Support Save feature, you may want to disable auto-recovery on the host system. When adapters are reset after an auto-recovery from a failure, traces initiated before the failure may be lost or overwritten.

To disable auto-recovery, use the following commands:

- For Linux, use the following commands, and then reboot the system:
  - To disable auto-recovery for the network (BNA) driver:

    ```
    insmod bna.o bnad_ioc_auto_recover=0
    ```
  - To disable auto-recovery for the storage (BFA) driver:

    ```
    insmod bfa.o ioc_auto_recover=0
    ```

- For VMware, use the following commands:
  - To unload and load the network (BNA) driver with IOC auto-recovery disabled, use the following commands:

    ```
    esxcfg-module -u bna
    esxcfg-module bna bnad_ioc_auto_recover=0
    ```

  - To disable IOC auto-recovery for the network (BNA) driver across reboots, use the following command:

    ```
    esxcfg-module -s "bnad_ioc_auto_recover=0" bna
    ```

  - To disable IOC auto-recovery for the storage (BFA) driver across reboots, use the following command:

    ```
    esxcfg-module -s "ioc_auto_recover=0" bfa
    ```

- For Windows, use the Registry Edit tool (regedt32) or the BCU **drvconf --key** command. Following is the **drvconf ---key** command:

  ```
  bcu drvconf --key ioc_auto_recover --val 0
  ```

- For Solaris, edit /kernel/drv/bfa.conf using the following command:

  ```
  ioc-auto-recover=0
  ```

NOTE

The BR-804 and BR-1007 adapters are not supported on Solaris systems.

Initiating Support Save through HCM

Launching the Support Save feature in HCM collects HCM application data. Launch Support Save by selecting **Tools > Support Save**.

Messages display during the Support Save operation that provide the location of the directory where data is saved. If you are initiating Support Save from a remote management station and receive a warning message that support files and Agent logs could not be collected, the HCM Agent is unavailable on the remote host. Select **Tools** > **Backup** to back up data and configuration files manually.

For more information and additional options for using this feature, refer to the *QLogic BR Series Adapter Administrator's Guide*.

Initiating Support Save through BCU commands

Use the **bfa_supportsave** command to initiate Support Save through the BCU:

- **bfa_supportsave**
  - Creates and saves the Support Save output under the /tmp directory on Linux and Solaris systems.
  - Creates and saves the Support Save output under the current directory for Windows systems.
- bfa_supportsave *dir* - Creates and saves the Support Save output under a directory name that you provide.
- bfa_supportsave *dir ss_file_name* - Creates and saves the Support Save output under a directory and file name that you provide. If the directory already exists, it will be overwritten.

NOTE

If specifying a directory, make sure that the directory does not already exist to prevent overwriting the directory. Do not just specify a drive (such as C:) or C:\Program Files.

Messages display as the system gathers information. When complete, an output file and directory display. The directory name specifies the date when the file was saved.

For more information on the **bfa_supportsave** command, refer to the *Host Connectivity Manager (HCM) Administrator's Guide*.

VMware ESX systems

For VMware ESXi 5.0 and later systems, BCU commands are integrated with the esxcli infrastructure. To initiate the BCU Support Save command, enter **esxcli brocade supportsave** on the ESX system.

Initiating Support Save through the Internet browser

Initiate **bfa_supportsave** through an Internet browser.

1. Open an Internet browser and type the following URL:

   ```
   https://localhost:34568/JSONRPCServiceApp/SupportSaveController.do
   ```

   In this URL, localhost is the IP address of the server from which you want to collect the **bfa_supportsave** information.

2. Log in using the factory default user name (admin) and password (password). Use the current user name and password if they have changed from the default.

   The **File Download** dialog box displays, prompting you to save the `SupportSaveController.do` file.

3. Click **Save** and navigate to the location where you want to save the file.

4. Save the file, but rename it with a “zip” extension; for example:

   `supportSaveController.zip.`

5. Open the file and extract contents using any compression utility program.

Initiating Support Save through a heartbeat failure

If a heartbeat failure occurs, Support Save data is collected at a system-wide level and an Application Log message is generated. You can view the details of these failures in the Master Log and Application Log tables in HCM.

Support Save differences

Following are differences in data collection for the HCM, BCU, and browser applications of **bfa_supportsave**:

- BCU - Collects driver-related logs, HCM Agent information, and configuration files.
- Browser - Collects driver-related and HCM Agent logs and configuration files.
- HCM - Collects HCM application data, driver information, HCM Agent logs, and configuration files.

NOTE

Master and Application logs are saved when Support Save is initiated through HCM, but not through BCU.

A Adapter Configuration

Introduction

Information in this appendix is optional for power users who want to modify values for adapter instance-specific persistent and driver-level configuration parameters. Rely on your operating system or storage vendor for guidance. Storage driver parameters can be modified for HBA, CNA, and Fabric Adapter in HBA, CNA or NIC port modes. Network driver parameters can be modified only for CNA or Fabric Adapter in HBA, CNA or NIC port modes.

Storage instance-specific persistent parameters

Instance-specific persistent configuration parameters for storage drivers with valid value ranges are listed in Table A-1. You can change these values using the BCU commands provided in the table. These parameters are stored in the following locations on your system:

- Linux and VMware - /etc/bfa.conf
- Solaris - /kernel/drv/bfa.conf
- Windows - Windows registry, under the following registry hives:

  For the HBA FC driver, Windows registry is HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\bfad\Parameters\Device

  For the CNA FCoE driver, Windows registry is HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\bfadfcoe\Parameters\Device

Values for these parameters should not be changed in the repository directly; instead use the corresponding BCU commands listed in Table A-1.

Table A-1. Adapter instance-specific parameters

Function	Parameter	Default value	Possible values	BCU command	Notes
authorization algorithm	bfa#-auth-algo	1	1: MD5 2: SHA1 3: MS 4: SM	auth --algo	Not supported in Solaris.
authorization policy	bfa#-auth-policy	off	0: on 1: off	auth --policy	Not supported in Solaris.
authorization secret	bfa#-auth -secret	NA	min chars - 0 max chars - 256	auth --secret	Not supported in Solaris.
Adapter name	bfa#adapter-serial num-name	NA	min chars - 0 max chars - 64	adapter --name	
vHBA interrupt coalesce	bfa#-coalesce	1	0: Off 1: On	vhba --intr	
vHBA interrupt delay	bfa#-delay	1125 (BR-1860, BR-1867) 75 (BR-815, BR-825) 25 (BR-804, BR-1007, BR-1020, BR-1741)	min: 1 ms max: 1125 ms 5 or 75 ms (BR-815, BR-825)	vhba --intr	

Table A-1. Adapter instance-specific parameters (Continued)

Function	Parameter	Default value	Possible values	BCU command	Notes
vHBA interrupt latency	bfa#-latency	225 (BR-1860, BR-1867) 15 (BR-815, BR-825) 5 (BR-804, BR-1007, BR-1020, BR-1741)	min: 1 ms max: 225 ms 1 or 15 ms (BR-815, BR-825)	vhba --intr	
log level	bfa#-log-level	3	1: Critical 2: Error 3: Warning 4: Info	log --level	
path time out value (TOV)	bfa#-pathtov	30	min: 1 max: 90	fcpim --pathtov	Supported in release 2.0 and later. A value of 0 forces an immediate failover. 1 - 60 sets a delay in seconds.
PCIe maximum read request size	bfa# pcie-max-read-req sz	512	128 256 512 1024 2048	Not available	This parameter determines the maximum size of a DMA read through PCIe.
port maximum frame size	bfa#-maxfrsize	2112	512 1024 2048 2112	port --dfsize	

Table A-1. Adapter instance-specific parameters (Continued)

Function	Parameter	Default value	Possible values	BCU command	Notes
port name	bfa#-port-name	NA	min chars - 0 max chars - 64	port --name	
port speed	bfa#-port-speed	0	0: auto select 1: 1 Gbps (HBAs) 2: 2 Gbps (HBAs) 4: 4 Gbps (HBAs) 8: 8 Gbps (HBAs) 16: 16 Gbps (HBAs) 10: 10 Gbps (CNAs)	port --speed	BR-825 and BR-815 support port speeds 2, 4 and 8 Gbps BR-804 supports port speeds 1, 2, 4, and 8 Gbps. BR-1860 and BR-1867 HGA ports support port speeds 2,4,8, and 16 Gbps 8 Gbps HBAs support port speeds 1 Gbps at the driver level, but not in a BIOS or boot over SAN configuration.

Table A-1. Adapter instance-specific parameters (Continued)

Function	Parameter	Default value	Possible values	BCU command	Notes
port topology	bfa#-port-topology	p2p	p2p loop auto	port --topology	Port topology is not supported on CNAs or Fabric Adapter ports configured in CNA or NIC mode.
port enable	bfa#-port-enable	True	True False	port --enable port --disable	

Managing instance-specific persistent parameters

Use BCU commands to modify instance-specific persistent parameters for storage drivers. For details on using these commands, refer to the *QLogic BR Series Adapter Administrator's Guide*.

vHBA Interrupt parameters

Following is an example of modifying the vHBA interrupt parameters.

`bcu vhba --intr` *`pcifn-id -coalesce`* `| -c {on|off} [<-l usecs -d` *`usecs`*`>`

where:

`pcifn-id`—PCI function number for the port where you want to set the log level.

`-coalesce | c`—Sets the coalesce flag. Possible values are on or off.

`-l latency`—Sets the latency monitor timeout value. Latency can be from 0 through 225 microseconds. A latency value of 0 disables latency monitor timeout interrupt.

`-d delay`—Sets the delay timeout interrupt value. A delay can be from 0 through 1125 microseconds. A delay value of 0 disables the delay timeout interrupt.

NOTE

You can also modify vHBA Interrupt Coalescing parameters through HCM. Refer to the *QLogic BR Series Adapter Administrator's Guide* for details.

Modifying PCIe max read request size

Refer to the comment section in the /kernel/drv/bfa.conf file on your system for an example.

Storage driver-level parameters

The driver-level configuration parameters are global parameters used by all storage driver instances. The default values for the driver configuration parameters are compiled into the driver.

These parameters should only be changed by power users with great caution.

Linux and VMware driver configuration parameters

The driver-level configuration values in Table A-2 are in the following locations on your system:

- Linux - /etc/modprobe.conf

NOTE

You can add driver-level configuration parameters to /etc/modprobe.conf so they will be persistent, but they are not listed in this file by default.

- VMware - /etc/vmware/esx.conf

Table A-2 describes the Linux and VMware configuration parameters.

Table A-2. Linux and VMware driver configuration parameters

Parameter	Default value	Notes
bfa_io_max_sge	SG_ALL	Maximum scatter gather elements supported (per I/O request). The max_sge is passed to SCSI during SCSI host template registration. The default is set to SG_ALL. SG_ALL as defined by the kernel. This can be either 255 or 128 depending on kernel version.

Table A-2. Linux and VMware driver configuration parameters (Continued)

Parameter	Default value	Notes
bfa_lun_queue_depth	32	Maximum SCSI requests per LUN. This parameter is passed to the SCSI layer during SCSI transport attach. During SCSI transport attach, this value is specified as 3 and adjusted to a maximum of 32 during I/O by calling the adjust_queue_depth SCSI interface.
fdmi_enable	1 (enabled)	Enables or disables Fabric Device Management Interface (FDMI) registrations. To disable, set this parameter to 0.
host_name	NULL	Host name.
linkup_delay	30 seconds	Sets the wait time for boot targets to come online. Local boot is immediate.
ioc_auto_recover	1 (enabled)	Auto-recover IOC (IO Controller) on heartbeat failure.
log_level	3 (Warning)	BFA log level setting. See bcu log --level information in the *QLogic BR Series Adapter Administrator's Guide* for more information.
max_rport_logins	1024	This limits number of logins to initiator and targets by physical ports and the logical ports.
max_xfer_size	32 MB	Maximum transfer size in Mb. Default value registered during SCSI host template registration.
msix_disable_cb for BR-815, BR-825 msix_disable_ct for BR-1020, BR-804, BR-1860, BR-1867	0	Disable (0) or enable (1) MSIx interrupt (and use INTx).
NetQueue	Enable	Enable or Disable. Configure in vSphere Client or vCenter Enables NetQueue for improving performance on servers with multiple CPUs. Refer to "Configuring NetQueue" on page 349
num_fcxps	64	Maximum number of unassisted FC exchanges.

Table A-2. Linux and VMware driver configuration parameters (Continued)

Parameter	Default value	Notes
num_ioims	2000	Maximum number of FCP IO requests.
num_rports	1024	Limits the number of logins to targets on a port (includes physical port and logical ports).
num_sgpgs	2048	Maximum number of scatter gather pages.
num_tms	128	Maximum number of task management commands.
num_ufbufs	64	Maximum number of unsolicited Fibre Channel receive buffers.
os_name	NULL	OS name.
os_patch	NULL	OS patch level.
pcie_max_read_reqsz	0	Wait time for the port to be online. 0 indicates use system setting.
reqq_size	256	Number of elements in each request queue (used for driver-to- firmware communication).
rport_del_timeout	90 (seconds)	Delay (in seconds), after which an offline remote port will be deleted.
rspq_size	64	Number of elements in each request queue (used for firmware-to- driver communication).
vmklnx_multiq	1	Module parameter provided to enable (1) or disable (0) the MultiQueue feature.

Managing Linux driver configuration

Either the driver configuration parameter values can be loaded with the driver or can be set in /etc/modprobe.conf before loading the driver. Display current driver configuration settings using the following command.

```
cat /sys/module/bfa/parameters/parameter
```

Examples

Following are examples to set the LUN queue depth:

- Load driver with the parameter value.

  ```
  modprobe bfa bfa_lun_queue_depth=40
  ```

- Add the following entry in /etc/modprobe.conf, and then load the driver.

  ```
  bfa options bfa_lun_queue_depth=40
  ```

Following are examples to disable IOC auto-recovery:

- Load driver with the parameter value.

  ```
  modprobe bna bnad_ioc_auto_recover=0
  ```

- Add the following entry in /etc/modprobe.conf, and then load the driver.

  ```
  bfa options ioc_auto_recover=0
  ```

Following are examples for disabling FDMI:

- Load driver with the parameter value.

  ```
  modprobe bfa_fdmi_enable=0
  ```

- Add the following entry in /etc/modprobe.conf, and then load the driver.

  ```
  modprobe bfa fdmi_enable=0
  ```

Managing VMware driver configuration

To set a configuration parameter use the following steps.

1. Enter the following command.

   ```
   esxcfg-module -s 'param_name=param_value' bfa
   ```

2. When you have set all desired parameters, reboot the system.

Examples

Following is an example to set the LUN queue depth.

```
esxcfg-module -s 'bfa_lun_queue_depth=1’bfa
```

Following is an example to disable FDMI.

```
esxcfg-module -s 'fdmi_enable=0 bfa' bfa
```

Important notes

Observe these notes when modifying driver configuration parameters:

- The esxcfg-module reads and updates from the file /etc/vmware/esx.conf.
- Editing this file directly is not recommended.
- Be careful not to overwrite the existing options. Always query the existing configuration parameter value before changing it using the following command:

  ```
  esxcfg-module -q
  ```

Windows driver configuration parameters

The BFA driver configuration parameters are located under the registry hive:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\bfad\Parameters\Device

Table A-3 describes the Windows configuration parameters.

Table A-3. Windows driver configuration parameters

Parameter	Default value	Notes
fdmi_enable [--val <0|1>]]	1	Enables or disables Fabric Device Management Interface (FDMI) registrations. To disable, set this parameter to 0.
bfa_lun_queue_depth	32	Maximum SCSI requests per LUN. This parameter is passed to the SCSI layer during SCSI transport attach
ioc_auto_recover	1	Auto recovery of IOC (IO Controller) on heartbeat failure.
rport_del_timeout	90	Delay in seconds, after which an offline remote port will be deleted.
rport_max_logins	1024	Maximum number of concurrent logins to a remote port.
msix_disable	0	Disable or enable MSIx interrupt (and use line-based INTx).

Managing Windows driver configuration parameters

To change any driver configuration parameter, use the Registry Edit tool (regedt32) or the BCU **drvconf --key** command. For details on using these commands, refer to the *QLogic BR Series Adapter Administrator's Guide.*

NOTE

- We recommend using the applicable BCU command to dynamically update the value (where available), rather than reloading the driver.
- Disabling the devices will disrupt adapter connectivity.
- To find out if the driver has unloaded successfully after disabling the host bus adapter or CNA devices in the Device Manager, run any BCU command. This should result in an "Error: No QLogic HBA Found" or "Error: No QLogic CNA Found" message. If the driver did not unload for some reason, the BCU command should complete normally.
- If the device icon display in Device Manager does not change to indicate that each HBA port device is disabled and if a message displays when you attempt to disable the devices that your hardware settings have changed and you must restart your computer for changes to take effect, confirm that the hcmagent.exe (QLogic HCM Agent Service) is not running on the host and that there are no open handles to file systems on disks accessed through the adapter.

Configuration using Registry Edit tool

Following are example steps to modify the rport_del_timeout parameter using the rport_del_timeout parameter.

1. Navigate to the following location:

   For HBA (FC), the registry is HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\bfad\Parameters\Device

   For CNA (FCoE), the registry is HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\bfadfcoe\Parameters\Device

2. Click **rport_del_timeout**.
3. Click **Edit ? Modify**.
4. For Value data, enter 60.
5. Click **OK**
6. Use the following steps to reload the driver and reinitialize the driver parameters from the modified registry:

a. Quiesce all application access to disks that are connected through the adapter.

b. Stop the QLogic HCM Agent Service (refer to “HCM Agent operations” on page 183 for instructions).

c. Open the Windows Device Manager (devmgmt.msc), and navigate to **SCSI and RAID controllers**. For CNAs, also navigate to **Ethernet controllers**.

d. To unload the driver, disable all QLogic BR-Series host bus adapter or CNA devices (each port has a device entry).

NOTE

For CNAs, you need to unload both the storage and network driver, so disable the CNA instances under **SCSI and RAID controllers** and **Ethernet controllers**.

e. To reload the driver, enable all QLogic host bus adapter or CNA devices.

Configuration using BCU commands

Use the following format for changing parameter values with the BCU **drvconf --key** command.

```
bcu drvconf --key key_name --val value
```

Following is an example for disabling FDMI.

```
bcu drvconf --key fdmi_enable --val 0
```

Following are possible key names and value ranges for driver configuration parameters.

- key = bfa_ioc_queue_depth, value range [0-2048] default = 2048
- key = bfa_lun_queue_depth, value range [0- 32] default = 32
- key = ioc_auto_recover, value range [0-1] default = 1
- key = rport_del_timeout, value range [0-90] default = 90
- key = rport_max_logins, value range [1-1024] default = 1024
- key = msix_disable, value range [0-1] default = 0
- key = fdmi_enable, value range [0-1] default = 1

Solaris driver configuration parameters

Table A-4 describes the Solaris configuration parameters.

NOTE

BR-804, BR-1007, and BR-1867 adapters are not supported on Solaris systems.

Table A-4. Solaris driver configuration parameters

Parameter	Default value	Notes
ioc-auto-recover	1	Auto recover IOC (IO controller) on heartbeat failure.
msix-disable	1	Disable MSIx interrupt (and use INTx).
num-fcxps	64	Maximum number of unassisted Fibre Channel exchanges.
num-ios	512	Maximum number of FCP IO requests.
num-rports	512	Maximum number of remote ports.
num-sgpgs	512	Maximum number of scatter gather pages.
num-tms	128	Maximum number of task management commands.
num-ufbufs	64	Maximum number of unsolicited Fibre Channel receive buffers.
reqq-size	256	Number of elements in each request queue (used for driver-to-firmware communication).
rspq-size	64	Number of elements in completion queues (used for firmware-to- driver communication).

Managing Solaris driver configuration parameters

To modify any driver parameter values, use the following steps.

1. Edit /kernel/drv/bfa.conf.

   For example, to set the number of FCP IO requests, use the following.

   ```
   num-ios=600
   ```

2. When you have set all desired parameters, reboot the system.

Network driver parameters

The driver configuration parameters are global parameters used by all network driver instances. The default values for the driver configuration parameters are compiled into the driver. Network drivers are only used for CNAs and for Fabric Adapter ports configured in CNA or NIC mode.

The driver-level configuration values discussed in this section are in the following locations on your system:

- Linux - /etc/modprobe.conf
- VMware - /etc/vmware/esx.conf
- Windows - Device Manager

NOTE

These parameters should only be changed from the default values by power users with great caution.

Windows

Table A-5 describes the instance-specific network configuration parameters available for Windows hosts.

Table A-5. Network driver configuration parameters

Function	Default value	Possible values	Method to configure	Notes
FlowControl, Transmit (Tx) and Receive (Rx)	Disable	Enable Disable	Device Manager	Enables 802.3x flow control for Windows Server 2008 R2 only.
Interrupt Moderation	Enable	Enable Disable	Device Manager	
IPv4 Checksum Offload	Enable	Rx Enable Tx Enabled Tx & Rx Enabled Disabled	Device Manager	Supported on Windows Server 2008 R2 for IPv4 traffic.
Jumbo Packet Size	1514	1514-9014	Device Manager	Sets MTU size. Size must not be greater than size set on switch that supports Data Center Bridging (DCB).
Large Segmentation Offload V1 IPv4 (LSOv1)	Enable	Enable Disable	Device Manager	Supported on Windows Server 2008 R2 for IPv4 traffic.
Large Segmentation Offload V2 IPv4 (LSOv2)	Enable	Enable Disable	Device Manager	Supported on Windows Server 2008 R2 for IPv4 traffic.
Large Segmentation Offload V2 IPv6 (LSOv2)	Enable	Enable Disable	Device Manager	Supported on Windows Server 2008 R2 for IPv4 traffic.
Locally Administered Address	N/A	Hexadecimal value for MAC address	Device Manager	Overrides the burned-in MAC address.

Table A-5. Network driver configuration parameters (Continued)

Function	Default value	Possible values	Method to configure	Notes
NDIS QoS	Disable	Enable Disable	Device Manager	Enables Windows Network Driver Interface Specification (NDIS) QoS
Priority and VLAN	Disable	Enable Disable	Device Manager	Enables hardware-assisted VLAN tagging.
Receive Buffers	2048	512, 1024, 2048	Device Manager	Tunes receive buffer value.
Receive Side Scaling (RSS)	Enable	Enable Disable	Device Manager	Supported on Windows Server 2008 R2
TCP/UDP IPv4 Checksum Offload	Enable	Enable Disable	Device Manager	Supported on Windows Server 2008 R2 for IPv4 traffic.
TCP/UDP IPv6 Checksum Offload	Enable	Enable Disable	Device Manager	Supported on Windows Server 2008 R2 for IPv6 traffic.
Teaming	N/A	Team up to eight ports.	Device Manager HCM[1] BCU commands.[1]	Creates team of adapter ports of following types: ■ Failover and failback ■ 802.3ad based link aggregation
VLAN ID	Disabled = 0	Can enable VLAN IDs with values from 0-4094	Device Manager HCM[1] BCU commands[1]	■ Create a single port VLAN with Device Manager. ■ Creates multiple VLANs using BCU commands or HCM. Disable VLANs in Device Manager. ■ Supported by Windows Server 2008 R2

Table A-5. Network driver configuration parameters (Continued)

Function	Default value	Possible values	Method to configure	Notes
VMQ	Enabled = 1	■ Enabled =1 Virtual machine queue capability is published to the operating system. ■ Disabled =0 Virtual machine queue capability is not published to the operating system.	Device Manager Configuring the VM to use VMQ can be done through SCVMM or hyper-V manager.	■ Virtual Machine Queue. ■ VMQ is only available when 2008 R2 driver is installed on a 2008 R2 operating system. ■ Unless the administrator configures a VM to use VMQ through SCVMM or hyper-V manager, it will not be used by the operating system.

1. Refer to the *QLogic BR Series Adapter Administrator's Guide* for details.

Managing Windows driver configuration with Device Manager

Use the Windows Device Manager to configure the following parameters:

- Flow Control
- Interrupt Moderation
- IPv4 Checksum Offload
- Jumbo Packet Size
- NDIS QoS
- Large Segmentation Offload V1 IPv4 (LSOv1)
- Large Segmentation Offload V2 IPv4 (LSOv2)
- Large Segmentation Offload V2 IPv6 (LSOv2)
- Locally Administered Network Address
- Receive Side Scaling (RSS)
- TCP/UDP IPv4 Checksum Offload
- TCP/UDP IPv6 Checksum Offload

Following is an example for using the Device Manager on Windows Server. To configure these parameters, use the following steps.

1. Run devmgmt.msc to open the **Device Manager** window.
2. Expand **Network Adapters**.

   An instance of the adapter model should display for each installed adapter port.
3. Right-click an adapter port instance and select **Properties** to display the **Properties** dialog box for the port.
4. Select the **Advanced** tab.

   Figure A-1 illustrates the **Advanced** tab from a host running Windows Server 2008 R2.

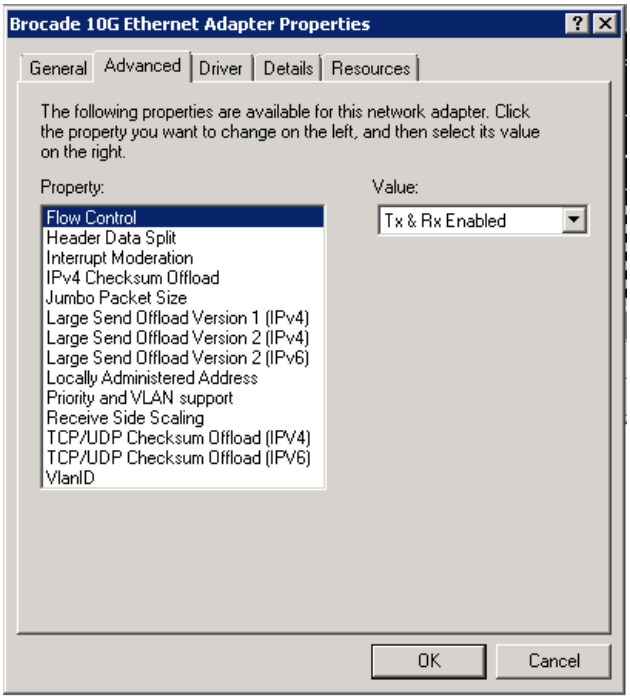


Figure A-1. Properties dialog box for adapter port (Advanced tab)

5. Select the **Property** that you want to configure and select the **Value**.
6. Click **OK** when finished.
7. Repeat steps 2 through 5 for each port that you want to configure.

NIC Teaming

When adapter ports are configured as members of NIC teams, an instance of the team name (Team#Team_Name) appears in the **Device Manager**. Right-clicking this instance displays a **Properties** dialog box similar to the example shown in Figure A-2 on page 337. Note that the team name (Failover) displays in the dialog box title. Configure team-related parameters for all ports belonging to a team using the **Advanced** tab.

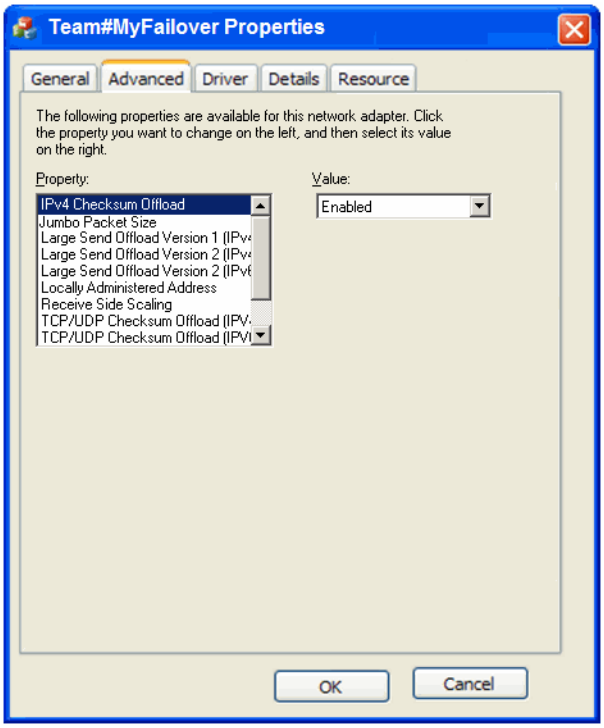


Figure A-2. Advanced Properties dialog box for team

An instance of a physical port that is part of a team displays in the **Device Manager** as “Team#Team Name” followed by the physical adapter name, for example, “Team#Failover QLogic 10G Ethernet Adapter.” Right-clicking this instance displays a **Properties** dialog box labeled “Team#Failover QLogic 10G Ethernet Adapter.” The **Advanced** tab contains the same parameters as shown in Figure A-1 on page 336 for the physical port. Note that you cannot configure the parameters in this dialog box that are configured for a team without removing the port as a member of the team. However, you can configure other parameters, such as VLAN ID, or Receive Buffers, as they are not team parameters.

Linux

Table A-6 describes the instance-specific network configuration parameters available for Linux hosts.

Table A-6. Network driver configuration parameters

Function	Default Value	Possible Values	Method to Configure	Notes
IOC auto recovery	1	1 = Enable 2 = Disable	bna_ioc_auto_recover	Auto recovery of IOC (IO Controller) on heartbeat failure.
ethtool-T			ethtool-T command	Display timestamp capabilities of Precision Time Protocol (PTP). This is applicable only to RHEL 6.4 systems and systems with kernel version 2.6.32-358.el6 and higher. Only software time stamping is supported.
Enable debugfs	1	1 = Enable 2 = Disable	bnaa_debugfs_enable	
Disable LRO	0	1 = Enable 0 = Disable	bnad_lro_disable	
Disable GRO	0	1 = Enable 0 = Disable	bnad_gro_disable	
Log Level	4	0 = EMERG 3 = Warning 4 = INFO 7 = DEBUG	Module parameter (bnad_log_level)	Linux log level

Table A-6. Network driver configuration parameters (Continued)

Function	Default Value	Possible Values	Method to Configure	Notes
Interrupt Moderation (Set for receive interrupts)	On	On Off	ethtool -C command	Reduces context switching and CPU utilization. When enabled, the hardware will not generate an interrupt immediately after it receives a packet, but waits for more packets or a time-out to expire
Jumbo Packet Size	1500	1514-9014 bytes	ifconfig command	Sets MTU size. Size must not be greater than size set on switch that supports Data Center Bridging (DCB).
TCP-UDP Checksum Offload (instance-specific parameter)	Enable	Enable Disable	ethtool-K command (offload -K ethX)	Enable or disable transmit and receive checksum offload.
TCP Segmentation Offload (TSO) (instance-specific parameter)	Enable	Enable Disable	ethtool K command (ethtool -K ethX)	
MSI-X (Message Signaled Interrupts Extended)	0	0 = Enable 1= Disable	Module parameter (bnad_msix_disable)	Parameter is only supported on 2.6 kernels that support MSI.
Locally Administered Address (MAC)	NA	Hexadecimal digits for MAC address.	ifconfig hw ether command	Overrides the burned-in MAC address.

Table A-6. Network driver configuration parameters (Continued)

Function	Default Value	Possible Values	Method to Configure	Notes
Interrupt Coalescing[1]	60 rx-usecs 100 tx-usecs 32 tx-frames 6 rx-frames[2]	1-1280 (8 bits) 0-1280 (8 bits) 0-256 (8 bits) 0-256 (8 bits)	ethtool -C command (coalescing ethX)	
Legacy Ethernet pause	NA	autoneg: off, on rx: off, on tx: off, on	ethtool -A command	Flow control mechanism for Ethernet.
VEB	0	1 = enable 0= disable	bna_veb_enable	Only supported as “technology preview” and not yet officially supported. Applicable to VMware and Linux Xen and Linux KVM as they support PCI pass through.

1. The default values are optimized for this feature and should only be modified by expert users with knowledge of how values change operation.
2. Modifying rx-frame values have no effect at this time as the inter-pkt mechanism is not enabled for the receive side.

Managing Linux driver configuration with ethtool

Following are examples of using the ethtool K commands to change adapter settings for driver parameters:

- TCP-UDP Checksum Offload

  To enable or disable TCP-UDP checksum offload, enter the following command:

  ```
  ethtool -K|--offload ethX [rx on|off] [tx on|off]
  ```

  where:

  `ethx`—Adapter position in server. For example, eth0 is the first Ethernet interface found in the system, eth1 is the second, eth2 is the third, and so on. Use appropriate name for the adapter.

  `rx`—Receive

  `tx`—Transmit

- TCP Segmentation Offload (TSO)

  ```
  ethtool -K ethX tso [on|off]
  ```

  where:

  `ethx`—Adapter position in server. For example, eth0 is the first Ethernet interface found in the system, eth1 is the second, eth2 is the third, and so on.

  `tso`—TCP Segmentation Offload

- Display current offload settings, enter the following command:

  ```
  ethtool -k ethX
  ```

  where:

  `ethx`—Adapter position in server. For example, eth0 is the first Ethernet interface found in the system, eth1 is the second, eth2 is the third, and so on.

- Interrupt Moderation

  ```
  ethtool -C vmnicX adaptive-rx on|off
  ```

  where:

  `ethx`—Adapter position in server. For example, eth0 is the first Ethernet interface in the system, eth1 is the second, eth2 is the third, and so on.

NOTE

For more information on using the **ethtool** command, refer to your Linux system documentation or ethtool man pages.

- Following is an example to enable or disable Ethernet pause.

  `ethtool -A ethx [autoneg on|off] [rx on|off] [tx on|off]`
  where:

  `ethx`—Adapter position in server. For example, eth0 is the first Ethernet interface found in the system, eth1 is the second, eth2 is the third, and so on.

  `autoneg`—Autonegotiate on or off

  `rx`—Receive on or off

  `tx`—Transmit on or off

Managing Linux driver configuration with module parameter

Either the driver configuration parameter values can be loaded with the driver or can be set in /etc/modprobe.conf before loading the driver. Following are examples of using modprobe to change network driver configuration:

- This example, sets the Linux logging level to debugging mode and loads the driver with the parameter value.

  ```
  modprobe bna bnad_log_level=7
  ```

- This example sets the Linux logging level to debugging mode. Add the entry in /etc/modprobe.conf, and then load the driver.

  ```
  options bna bnad_log_level=7
  ```

- This example enables or disables MSI-X and loads the driver with the parameter value.

  ```
  modprobe bna bnad_msix=[0|1]
  ```

- This example enables or disables MSI-X. Add the entry in /etc/modprobe.conf, and then load the driver.

  ```
  options bna bnad_msix_disable=[0|1]
  ```

  NOTE

  MSI-X is enabled in the network driver by default, and must remain enabled for NetQueue to function. Enabling NetQueue in VMware system also enables MSI-X in the system. If enabling NetQueue, make sure that bnad_msix=0 is not listed in VMware module parameters because that would disable NetQueue.

Managing Linux driver configuration with module ifconfig

Following are examples of using ifconfig to change network driver configuration.

- This example, sets the locally administered MAC address.

  ```
  ifconfig ethX hw ether [addr]
  ```

  where:

  `ethx`—Adapter position in server. For example, eth0 is the first Ethernet interface found in the system, eth1 is the second, eth2 is the third, and so on.

- This example, sets the Jumbo Packet (MTU) size.

  ```
  ifconfig ethx mtu MTU size
  ```

  where:

  `ethX`—Adapter position in server. For example, eth0 is the first Ethernet interface found in the system, eth1 is the second, eth2 is the third, and so on.

  `MTU size`—MTU size (1514-9014 kb)

VMware

Table A-7 describes the instance-specific network configuration parameters available for VMware hosts. You can list all module parameters that you can configure for the network driver using the following command.

```
vmkload_mod -s bna
```

Table A-7. Network driver module parameters

Parameter	Default value	Possible values	Method to configure	Notes
bnad_num_rx_netq	-1	-1 1 0		■ Maximum number of Rx NetQueues. ■ One Rx NetQueue (Minimum). ■ Zero Rx NetQueue (Disabled).
bnad_num_tx_netq	-1	-1 1 0		■ Maximum number of Tx NetQueues. ■ One Tx NetQueue (Minimum). ■ Zero Tx NetQueues (Disabled).
Jumbo Packet Size	1500	1500-9000	esxcfg-vswitch command	■ Sets MTU size. ■ Size must not be greater than size set on switch that supports Data Center Bridging (DCB). ■ You must enable the MTU size for each vswitch or VMkernal interface.
VLAN ID	Disabled = 0	Can enable VLAN IDs with values from 0-4094	esxcfg-vswitch command	Assign a VLAN ID to a port group on a specific vswitch

Table A-7. Network driver module parameters (Continued)

Parameter	Default value	Possible values	Method to configure	Notes
MSI-X (Message Signaled Interrupts Extended)	Enable (0)	1 = Disable 0 = Enable	cfg module parameter (bnad_msix_disable)	■ Advanced user configuration ■ This parameter is used to disable (MSI-X). ■ The parameter is enabled by default in the network driver. However, the NetQueue feature of VMware must be enabled in the VMware system to enable MSI-X in the system. ■ Driver will attempt to enable, but use INTx in case MSI-X is not supported or NetQueue is not enabled.
Interrupt Moderation (Set for receive interrupts)	On	On Off	ethtool -C command	Reduces context switching and CPU utilization. When enabled, the hardware will not generate an interrupt immediately after it receives a packet, but waits for more packets or a time-out to expire

Table A-7. Network driver module parameters (Continued)

Parameter	Default value	Possible values	Method to configure	Notes
NetQueue	Enabled	Enable Disable	Configure in vSphere Client or vCenter	Enables NetQueue for improving receive-side networking performance on servers with multiple CPUs. Refer to "Configuring NetQueue" on page 349
Other NetQueue Configuration ■ Number of NetQueues and filters ■ Heap values	NA	NA	esxcfg-module	Refer to "Configuring NetQueue" on page 349.
Legacy Ethernet pause	NA	autoneg: off, on rx: off, on tx: off, on	ethtool -A command	Flow control mechanism for Ethernet.
Enable or disable rx bw limiting.	enable	Disable Enable	bnad_rbl_enable	
Disable LRO	0	1 = Enable 0 = Disable	bnad_lro_disable	
Disable GRO	0	1 = Enable 0 = Disable	bnad_gro_disable	
Transmit NetQueues	0	0 = Enabled. 1 = Disabled	bnad_tx_netq_disable	
Receive NetQueues	0	0 = Enabled. 1 = Disabled	bnad_rx_netq_disable	

Managing VMware driver configuration with cfg

- Following is an example of using the **esxcfg-module** command to disable message signaled interrupts (MSI-X).

  ```
  esxcfg-module -s ”bnad_msix_disable=1” bna
  ```

  where:

  `bnad_msix_disable`—QLogic network adapter message signaled interrupts

  1—Disables MSI-X and enables INTx mode instead.

  NOTE

  MSI-X is enabled in the network driver by default, and must remain enabled for NetQueue to function. Enabling NetQueue in VMware system also enables MSI-X in the system by default. If enabling NetQueue, make sure that bnad_msix_disable=1 is not listed in VMware module parameters because that would disable NetQueue.

- Display current driver configuration settings using the following command:

  ```
  esxcfg-module -g bna
  ```

- Following is an example of using the **esxcfg** command to set the Jumbo Packet (MTU) size.

  First, set the MTU size on a virtual switch using the following command.

  ```
  esxcfg-vswitch -m MTU size vSwitch ID
  ```

  where:

  `MTU size`—MTU size (1514-9014 kb)

  `vSwitch ID`—Virtual switch identification, such as vSwitch0

  Display a list of virtual switches on the host system and their configurations using the following command.

  ```
  esxcfg-vswitch -l
  ```

Next, create VMkernal interface with the MTU setting.

`esxcfg-vmknic -a “VM Kernel” -i IP address -n subnet mask -m MTU size`
where:

`VM Kernel`—VMkernal name.

`IP address`—IP address for VMkernel NIC

`subnet mask`—Subnet mask for VMkernel NIC

`MTU size`—MTU size (1500-9000 kb)

- Following is an example to configure a VLAN ID for a port group on a specific virtual switch.

  `esxcfg-vswitch -v VLAN ID -p port group name virtual switch name`
  where:

  `VLAN ID`—ID of 0-4094. A value of 0 disables VLANs.

  `port group name`—Name of port group you have configured for virtual switch.

  `virtual switch name`—Name of virtual switch containing port group.

NOTE

For more information on using the **esxcfg** commands, refer to your VMware system documentation or man pages.

- Following is an example to enable or disable Ethernet pause.

  `ethtool -A eth<X> [autoneg on|off] [rx on|off] [tx on|off]`

  where:

  `ethx`—Adapter position in server. For example, eth0 is the first Ethernet interface found in the system, eth1 is the second, eth2 is the third, and so on.

  `autoneg`—Autonegotiate on or off

  `rx`—Receive on or off

  `tx`—Transmit on or off

Managing VMware driver configuration with ethtool

To enable or disable interrupt moderation, use the following command.

```
ethtool -C ethX adaptive-rx on|off
```

where:

`ethx`—Adapter position in server. For example, eth0 is the first Ethernet interface found in the system, eth1 is the second, eth2 is the third, and so on.

Configuring NetQueue

NetQueue improves performance on servers in 10 Gigabit Ethernet virtualized environments. NetQueue provides multiple receive and transmit queues on the CNA, which allows processing on multiple CPUs to improve network performance.

NOTE

MSI-X is enabled in the network driver by default, and must remain enabled for NetQueue to function. Enabling NetQueue in VMware system also enables MSI-X in the system. Please make sure that bnad_msix_disable=1 is not listed in VMware module parameters because that would disable NetQueue.

You can use *ethtool* to obtain hardware statistics to verify traffic over different receive and transmit queues. You can also use the VMware *vsish* utility to display current NetQueue information, such as maximum number of queues, number of active queues, and default queue identification.

Use the following example procedures to enable or disable NetQueue, change the number of NetQueues and filters, and to set system heap values appropriately for using NetQueue and jumbo frames.

Enable or disable NetQueue with VI Client screens

Following is an example of using VI Client configuration screens to enable and disable NetQueue.

Enable NetQueue in VMkernel using the VI Client as follows.

1. Log in to the VI Client.
2. Click the **Configuration** tab for the Server host.
3. Click **Advanced Settings**.
4. Click **VMkernel**.
5. Select the check box for **VMkernel.Boot.netNetqueueEnabled**, and then click **OK**.
6. Reboot the server.

Disable NetQueue in VMkernel using the VI Client as follows.

1. Log in to the VI Client.
2. Click the **Configuration** tab for the Server host.
3. Click **Advanced Settings**.
4. Click **VMkernel**.
5. Select the checkbox for **VMkernel.Boot.netNetqueueDisabled**, and then click **OK.**
6. Reboot the server.

NOTE

For more information on using this command, refer to your VMware system documentation on enabling NetQueue in VMware 4.0.

Managing the number of NetQueues and filters with cfg

For the QLogic driver, you cannot directly configure the number of NetQueues and filters per NetQueue. By default, these values are based on the number of receive queue sets used, which are calculated from the number of CPUs in the system. In general, NetQueues and filters per NetQueue are calculated according to the following guidelines:

- Including the default NetQueue, the number of NetQueues equals the number of CPUs in the system, or a maximum of 8. When Jumbo frames are enabled, the maximum is 4.
- The number of filters per receive NetQueue is calculated so that hardware resources are distributed equally to the non-default NetQueues.

Table A-8 summarizes NetQueues and Receive Filters per NetQueue values per number of CPUs for CNA models.

Table A-8. NetQueues and filters per NetQueue for CNAs

CPUs	NetQueues (no default)	NetQueues (jumbo)	Receive Filters per NetQueue
1	0	0	0
2	1	1	63
4	3	3	21
8	7	3	9
16	7	3	9

Table A-8. NetQueues and filters per NetQueue for CNAs (Continued)

CPUs	NetQueues (no default)	NetQueues (jumbo)	Receive Filters per NetQueue
32	7	3	9
64	7	3	9
128	7	3	9

Table A-9 summarizes NetQueues and Receive Filters per NetQueue values per number of CPUs for Fabric Adapter ports configured in CNA mode.

Table A-9. NetQueues and filters per NetQueue for Fabric Adapter ports in CNA mode

CPUs	NetQueues (no default)	NetQueues (jumbo)	Receive Filters per NetQueue
1	0	0	0
2	1	1	31
4	3	3	10
8	7	3	4
16	7	3	4
32	7	3	4
64	7	3	4
128	7	3	4

Setting heap size

Enabling NetQueue and using jumbo frames can cause the network stack to run out of heap when default values are set for netPktHeapMaxSize and netPktHeapMinSize. To set heap values to appropriate values, use the following steps.

1. Log in to the VI Client.
2. Click the **Configuration** tab for the Server host.
3. Click **Advanced Settings**.
4. Click **VMkernel**.

5. Find the corresponding value field for VMkernel.Boot.netPktHeapMaxSize, and enter 128.
6. Find the corresponding value field for VMkernel.Boot.netPktHeapMinSize, and enter 32.
7. Click **OK** to save the changes.
8. Reboot the system.

Enabling jumbo frames for Solaris

For Solaris 10 and 11, you can enable support for jumbo packet frames and set the MTU size for these frames up to 9014. Use the following steps:

1. Add the following line to the bna.conf file. This file is located in /kernel/drv/bna.conf.

   ```
   bna<x>-port-mtu=mtu_size
   ```

   where:

   x—BNA (Brocade Network Adapter) driver instance number

   `mtu_size`—1500-9000

   NOTE

   Size must not be greater than size set on the switch that supports Data Center Bridging (DCB).

2. Reload the driver.
3. Enter the following command based on your operating system:

   - Solaris 10:

   ```
   ifconfig bna<instance number> mtu <MTU size set in Step 1>
   ```

   - Enter the following command for Solaris 11:

   ```
   dladm set-linkprop -p mtu=<MTU size set in Step 1>
   bna<instance number>
   ```

B MIB Reference

Table B-1 provides information on the MIB groups and objects that support the Simple Network Management Protocol for CNA adapters and Fabric Adapter ports configured in CNA mode. For more information on adapter SNMP support, refer to “Simple Network Management Protocol” on page 67.

Table B-1. Supported MIB groups and objects for SNMP

Group	MIB Objects	Function
Product Identification Group	productIDDisplayName	Name of this product
	productIDDescription	Short description of the product
	productIDVendor	Manufacturer
	productIDVersion	Firmware version
	produtIDBuildNumber	Build version
	productIDURL	URL of WEB-based application to manage this product.
	productIDDeviceNetworkName	Operating system-specific computer name
Product Status Group	productStatusGlobalStatus	Current status of the product
	productStatusLastGlobalStatus	Other/Unknown/OK/Non-Critical/ Critical/Non-recoverable
	productStatusTimestamp	The status before the current status
Physical Group (Adapter Attributes)	adapterIndex	Index of the adapter

Table B-1. Supported MIB groups and objects for SNMP (Continued)

Group	MIB Objects	Function
	adapterName	Name of the adapter
	adapterType	Type of adapter.
	adapterSerialNumber	Serial Number
	adapterModelInfo	Model information for the adapter.
	adapterCardType	Adapter card type such as mezzanine, non mezzanine
	adapterOEMInfo	An OEM-specific information (if applicable)
	adapterPCIVendorId	PCI Vendor ID
	adapterPCIDeviceId	PCI Device ID
	adapterPCISsvId	PCI Subsystem Vendor ID
	adapterHWVersion	Hardware version
	adapterPortCount	Number of ports on the adapter.
Physical Group (Port Attributes)	portAdapterIndex	Adapter index of the port
	portIndex	Port Index
	portLinkStatus	Port link status
	portDuplexMode	Port duplex mode
	portAutonegotiateMode	Port autonegotiate mode enabled or disabled
	portMaxSpeed	Maximum speed of the port
	portPCIFnCount	Function number of PCI functions of port
Physical Group (Interface Attributes)	ethAdapterIndex	Adapter Index of the interface
	ethPortIndex	Interface port index
	ethPCIFnIndex	interface PCI function number.
	ethName	interface name

Table B-1. Supported MIB groups and objects for SNMP (Continued)

Group	MIB Objects	Function
	ethLargeReceiveOffload	Enabled or disabled state of large receive offload
	ethLargeSendOffloadv4	Enabled or disabled state of large send offload for IPv4
	ethLargeSendOffloadv6	Enabled or disabled state of large send offload for IPv6
	ethIPv4ChecksumOffload	Enabled or disabled state of IPv4 checksum offload
	ethIPv6ChecksumOffload	Enabled or disabled state of IPv6 checksum offload
	ethMode	Loopback, promiscuous, or normal mode
	ethMTU	Maximum transmission unit configured
	ethMacAddress	Interface MAC address
Logical Group (VLAN Attributes)	vLanAdapterIndex	VLAN adapter Index
	vLanPortIndex	VLAN port index
	vsVLanPCIFnIndex	Function index of the interface
	vLANId	VLAN index
	vLANName	Name of the device as it appears in device manager (for example, QLogic 10G advanced virtual miniport #1)
	vLANInterfaceName	Name of the interface as it appears in network connections list (for example, local area connection #X)
	vLANEnabled	VLAN state enabled 1, disabled 0
	vLANStatus	Connected or disconnected

Table B-1. Supported MIB groups and objects for SNMP (Continued)

Group	MIB Objects	Function
Logical Group (Team Attributes)	teamId	Unique Identifier of the team
	teamName	Unique team name
	teamMode	Team mode such as none, failback, 802-2ad
	teamPreferredPrimaryIndex	Index of the primary member
	teamCurrentPrimaryIndex	Current primary member index
	teamMACAddress	MAC Address of the team
	teamNumberOfMembers	Number of members of the team
	teamIPAddress	Team IP Address
Logical Group (Team Members)	tmTeamId	Index of the team
	tmTeamMemberId	Index of the team member
	tmTeamPCIFnIndex	Index of the interface
	teamAdapterIndex	Index of the adapter
	teamPortIndex	Index of the port
	teamMemberType	Type of the team member
	teamMemberStatus	Status of the member
	teamMemberMACAddress	MAC address of the member
Statistics Group (Interface Statistics)	ethStatsAdapterIndex	Interface adapter index
	ethStatsPortIndex	Interface port index
	ethStatsPCIFnIndex	Interface PCI function number
	ethRxPackets	Number of packets received
	ethTxPackets	Number of packets transmitted
	ethRxBytes	Number of bytes received
	ethTxBytes	Number of bytes transmitted

Table B-1. Supported MIB groups and objects for SNMP (Continued)

Group	MIB Objects	Function
	ethRxErrors	Number of receive errors
	ethTxErrors	Number of transmission errors
	ethRxDroppped	Number of packets dropped
	ethTxDropped	Number of packets not transmitted
	ethRxMulticast	Number of multicast packets received
	ethRxBrodcast	Number of broadcast packets received
	ethLinkToggle	Link Toggle count
	ethmacRxDrop	Number of packets dropped
	ethmacTxDrop	Number of packets not transmitted
	ethmacRxBytes	Number of bytes received
	ethmacRxPackets	Number of packets received
	ethmacTxBytes	Number of bytes transmitted
	ethmacTxPackets	Number of packets transmitted
	ethRxCRCErrors	Number of packets received with CRC errors
	ethTxHeartbeatErrors	Number of heartbeat errors
Statistics Group (VLAN Statistics)	vLanAdapterIndex	VLAN adapter Index
	vLanPortIndex	VLAN port Index
	vsVLanPCIFnIndex	Index of the interface
	vLANId	VLAN identification
	vLANTxPackets	Number of packets transmitted
	vLANRxPackets	Number of packets received
	vLANTxErrors	Number of transmission errors
	vLANRxErrors	Number of receive errors

Table B-1. Supported MIB groups and objects for SNMP (Continued)

Group	MIB Objects	Function
Statistics Group (Team Statistics)	tsTeamId	Index of the team member
	teamTxPackets	Number of packets transmitted
	teamRxPackets	Number of packets received
	teamTxErrors	Number of transmission errors
	teamRxErrors	Number of receive errors
Traps and Events Group	vLANAddedTrap	VLAN added
	vLANRemovedTrap	VLAN removed
	teamMemberAddedTrap	Team member added
	teamMemberRemovedTrap	Team member removed
	teamFailoverTrap	Team failover
	teamFailbackTrap	Team failback
	teamvLanAddedTrap	Sends the trap when a VLAN is added to a team
	teamvLanRemovedTrap	Sends the trap when a VLAN is removed from a team
	teamAddedTrap	Team added
	teamRemovedTrap	Team removed
	LinkUp (supported by native SNMP service)	Port link up event
	LinkDown (supported by native SNMP service)	Port link down event

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